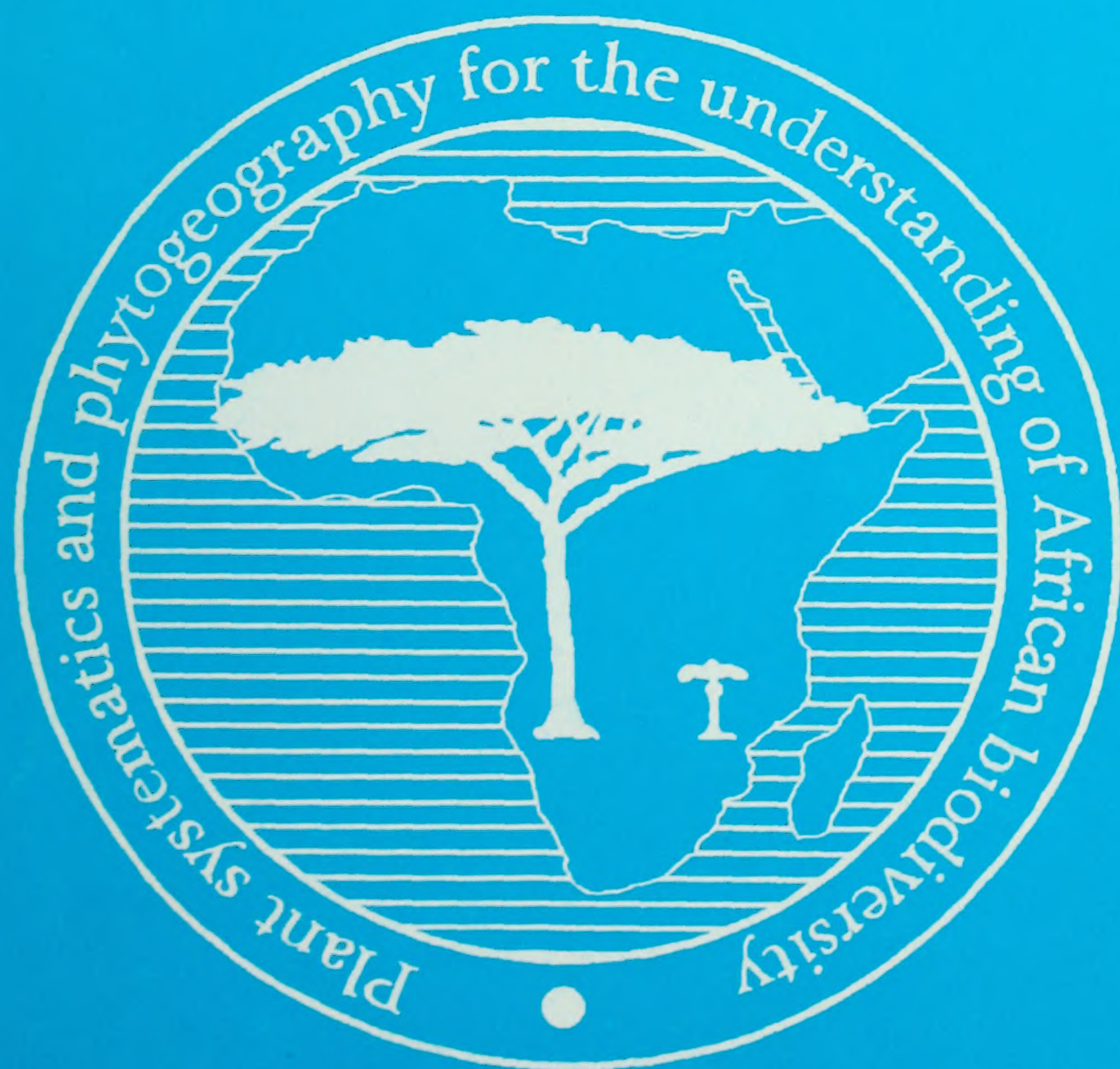


XVIth AETFAT Congress
August 28 - September 2, 2000

XVlième Congrès de l'AETFAT
28 août - 2 septembre 2000

ABSTRACTS – RÉSUMÉS



Plant systematics and phytogeography
for the understanding of African biodiversity



*La systématique des plantes et la phytogéographie
pour une meilleure compréhension de la biodiversité africaine*



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XVIth AETFAT Congress

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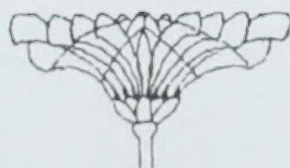
(August 28 - September 2, 2000)

Abstracts

XVlième Congrès de l'AETFAT

(28 août - 2 septembre 2000)

Résumés



Meise

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The present book of abstracts (lectures and posters) and participants reflects the state of registration for the sixteenth AETFAT Congress mid-June 2000. Later registrations are not considered.

La présente brochure avec résumés (conférences et affiches) et liste des participants tient compte des inscriptions au seizième Congrès de l'AETFAT à la mi-juin 2000. Les inscriptions tardives n'ont pas pu être prises en compte.

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Main themes and sessions

Areas / Orientation régionale

- AREAS1 The lowland forest flora's of Africa
Les flores des forêts africaines de basse altitude
Chair: J. Lejoly & J.-J. Symoens
- AREAS2 Flora and phytogeography of miombo type woodlands and savannas
Flore et phytogéographie des forêts claires de type miombo et des savanes
Chair: F. Malaisse & J.-J. Symoens
- AREAS3 The montane floras of Africa
Les flores montagnardes de l'Afrique
Chair: Achoundong & J.-J. Symoens
- AREAS4 Plant diversity of Madagascar, the Mascarenes and the Comores
La diversité des plantes de Madagascar, des Mascareignes et des Comores
Chair: P.P. Lowry & J.-J. Symoens

Floristics / Floristique

- FLOR1 The history of botanical exploration of Africa South of the Sahara
L'historique de l'exploration botanique de l'Afrique au sud du Sahara
Chair: H. Beentje & J. Degreef
- FLOR2 Herbaria and botanical gardens in tropical Africa: their role for systematics
Les Herbiers et Jardins botaniques en Afrique tropicale: leur rôle en systématique
Chair J. Rammeloo & J. Degreef
- FLOR3 Progress in the Flora's of Africa
Progrès des Flores africaines
Chair: L.J.G. Van der Maesen & J. Degreef
- FLOR4 Computerised floristic information for the African flora
Données floristiques informatisées de la flore africaine
Chair: S. Liede & J. Degreef

African macrofungi / Macromycètes africains

- MACRO1 African macrofungi
Macromycètes africains
Chair: A. Fraiture

Thèmes principaux et sessions

Phytogeography / *Phytogéographie*

PHYTO1 White's concepts refined
 Révision des concepts de White
 Chair: R. Gereau & F. Malaisse

PHYTO2 Techniques and tools
 Techniques et méthodes
 Chair: B. Sinsin & F. Malaisse

Plant utilization / *Utilisation des plantes*

PLANT1 Plant utilization and its effect on biodiversity and conservation
 Utilisation des plantes et impact sur la biodiversité et la conservation
 Chair: J. Rammeloo

Systematics / *Systématique*

SYST1 Monographs of African genera
 Monographies de genres africains
 Chair: L. Aké Assi & E. Robbrecht

SYST2 Family level systematics
 Systématique au niveau de la Famille
 Chair: B. Khayota & E. Robbrecht

SYST3 Molecular approaches towards taxonomy of African plants
 Approches moléculaires de la taxonomie des plantes africaines
 Chair: I. Friis & E. Robbrecht

SYST4 Orchid taxonomy and conservation
 Taxonomie et conservation des orchidées
 Chair: B. Bytebier & E. Robbrecht

Various contributions / *Autres contributions*

VAR1 Various contributions
 Autres contributions
 Poster session

Abstracts are in alphabetical sequence following the names of the authors of lectures and posters [if multi-authored: presenting author of a lecture underlined].

Les résumés sont classés par ordre alphabétique d'après le nom de leur auteur. Dans le cas de contributions cosignées par plusieurs auteurs est souligné le nom du conférencier.

Abstracts – Résumés

Daniel K. ABBIW

Botany Department, University of Ghana, Legon-Accra, Ghana

[Poster - FLOR1]

Commemorative plant names of collectors old and new in Ghana

The name of a plant may depend on:

- the locality, country or geographic zone where the plant grows,
- the habitat or some characteristic peculiar to that plant, or
- the identity of the botanist who collected the type specimen.

In this presentation, the names of all the principal plant collectors from 1697 - 2000 are listed, and those collectors commemorated by plant names are displayed with herbarium specimens.

Gaston ACHOUNDONG

Herbier national, Yaoundé, Cameroun

[Lecture - SYST1]

Les *Rinorea* africains: biodiversité et répartition

Les *Rinorea* sont des Violacées ligneuses, pantropicales, plus diversifiées en Afrique que dans les autres continents (Hekking 1988). Pourtant les *Rinorea* africains sont relativement mal connus. Cette méconnaissance est due à la multiplicité des espèces et surtout à un manque de recherche appropriée sur le terrain, où les espèces sont plus facilement reconnaissables qu'en herbier.

Il est actuellement difficile d'identifier les *Rinorea* par les documents existants (collections d'herbier et clés publiées), car:

- 1 - de nombreux échantillons, même cités dans des publications, ont été identifiés sans avoir été comparés aux types; il s'est ainsi créé dans les herbiers et dans la littérature une série d'erreurs qui se perpétuent.
- 2 - Les protologues ont généralement été rédigés à partir de matériel peu abondant et à une période où de nombreuses espèces n'étaient pas encore connues; aujourd'hui certains d'entre eux se présentent comme des descriptions peu précises donnant des caractères peu discriminants pour les espèces qu'ils ne permettent pas du tout de circonscrire correctement;
- 3 - des types créés sur du matériel incomplet ou immature sont actuellement difficiles à utiliser si on veut s'en servir pour séparer les spécimens adultes des espèces affines; les caractères discriminants sont le plus souvent localisés sur les pièces fertiles matures; par exemple, le type de *Rinorea brachypetala*, a une inflorescence immature; ceci a entraîné une profonde confusion impliquant plusieurs espèces pourtant parfaitement distinctes comme *Rinorea batesii*, *R. rubrotincta*, *R. ovata*.

Les données de terrain insuffisantes, les déterminations hâtives en l'absence des types, les protologues imprécis, les types immatures, ont contribué à embrouiller l'étude des *Rinorea* africains. Une révision du groupe était donc souhaitable (Letouzey 1968, Bos 1989). C'est cette lacune que ce travail souhaite combler en privilégiant les observations *in situ* et les déterminations à partir des types.

Notre contribution sera en priorité axée sur une meilleure définition des espèces déjà nommées et la mise en évidence des affinités entre les espèces. Ceci se fera dans la perspective d'une esquisse phylogénique des représentants africains du genre. Pour ce faire, nous avons consulté les collections des herbiers suivants: Yaoundé, Paris, Wageningen, Meise, Kew, British Museum, Hambourg. Nous avons reçu la plupart des types des espèces décrites d'Afrique.

En définitive, une bonne clé chez les *Rinorea* nécessite le concours des autres sciences (biométrie, analyse moléculaire). Comme bio-indicateurs des types forestiers (Achoundong 1996) et éléments importants des chaînes trophiques (Amiet 1996) les *Rinorea* doivent être bien connus.

A. ADOMOU & L. J. G. VAN DER MAESEN

Laboratory of Plant Taxonomy, Wageningen, The Netherlands

[Poster - SYST1]

Millettia sect. *Efulgentes*

The taxonomy of *Millettia* Wight & Arn. is in need of revision. For Africa, sect. *Efulgentes* is under review. The distinction with sect. *Opacae* is just the shininess of the leaves. Is this correct? In line with the Asian species the African material has been described and prepared for phylogenetic analysis.

Laurent AKÉ ASSI

[Lecture - SYST2]

Université d'Abidjan, Centre national de Floristique, Abidjan, Côte d'Ivoire

Observations sur la diversité des Sapotaceae de la flore de la Côte d'Ivoire

La famille des Sapotaceae compte, en Côte d'Ivoire, quinze genres dont la chorologie est la suivante: africains, onze; pantropicaux, deux (*Chrysophyllum*, *Manilkara*); paléotropical, un (*Mimusops*); afro-néotropical, un (*Pouteria*). Au niveau spécifique, 42 Sapotaceae ont été répertoriées dans les différentes formations végétales du pays. Parmi ces plantes, 35, soit 83% des espèces recensées, sont guinéo-congolaises; trois poussent, indifféremment, en région de forêt dense humide et en savane; quatre autres sont caractéristiques de la région soudano-zambézienne. Sur les 35 espèces guinéo-congolaises, neuf sont endémiques ouest-africaines. Parmi celles-ci, trois n'ont été, jusqu'à présent, rencontrées qu'à l'intérieur des limites de la Côte d'Ivoire.

Laurent AKÉ ASSI

[Lecture - SYST4]

Université d'Abidjan, Centre national de Floristique, Abidjan, Côte d'Ivoire

Quelques Orchidaceae endémiques du bloc forestier ouest-africain

La famille des Orchidaceae est représentée, en Côte d'Ivoire, par 204 taxons de rang spécifique, et 47 genres. Sur les 204 espèces recensées, 199, soit 97%, sont africaines, contre seulement sept pluricontinentales, plus précisément, communes à l'Afrique et à l'Amérique du Sud (deux espèces) ou à des îles de l'Océan Indien (cinq espèces). La région guinéo-congolaise est la zone de prédilection des Orchidaceae, car y sont confinées 170 des espèces répertoriées dans le pays. Sur les 170 taxons vivant en forêt dense humide, vingt sont endémiques ouest-africaines, et n'ont été, jusqu'à présent, rencontrées qu'à l'intérieur des frontières de la région comprise entre le Togo et le Sénégal. Parmi ces espèces, trois sont propres à la Côte d'Ivoire.

A. AKOEGNINOU¹, W. Joost VAN DER BURG² & L.J.G. VAN DER MAESEN²

[Lecture - FLOR3]

¹ Université nationale du Bénin, FAST, Cotonou, Bénin

² Laboratory of Plant Taxonomy, Wageningen, The Netherlands

Projet Flore du Bénin – a flora and more

Presentation, mid-term, of the collaboration between the Netherlands and Benin to produce the first comprehensive analytical flora of Benin. Besides the flora book itself, the project has a number of deliverables: a new herbarium building, some 20,000 new collections throughout the country, PhD-fellowships, training of staff and the production of dedicated publications.

Guy-Alain AMBE¹ & François MALAISSE²

[Poster - PLANT1]

¹ Laboratoire d'Ecologie, Faculté de Sciences Agronomiques de Gembloux, Belgique

² Jardin botanique national de Belgique, Meise, Belgique

Reflection on systems for identification and designation of plants used by the Malinké people of Ivory Coast

The recognizing of plants by indigenous people is based on various systems. In order to understand the system used by the Malinké people, an ethnobotanical study was undertaken in some villages of the Department of Séguéla (North of Ivory Coast). After an inventory of useful plants in the area (scientific name, utilization and ecology), vernacular appellations (in Dioula) were particularly investigated by the means of local signification and etymology. Analyze of this information reveals various ways of identification and designation based on analogical or

Réflexions relatives aux systèmes de reconnaissance et de dénomination des taxons botaniques chez les Malinkés de Côte-d'Ivoire

La reconnaissance des plantes par les peuples indigènes est basée sur des systèmes variés. Pour mieux comprendre le système utilisé par les Malinkés, une étude ethnobotanique a été conduite dans des villages du Département de Séguéla (nord de la Côte d'Ivoire). Suite à un inventaire des plantes utilisées dans la région (noms scientifiques, usages et écologie), les appellations vernaculaires (en langue Dioula) ont fait l'objet d'une étude approfondie relative aux significations locales et à l'étymologie de ces plantes. L'analyse de ces informations révèle l'existence de

manner characters (morphology, gustatory, olfactory, onomatopoeia, etc.).

The Malinké system takes into account botanical characters and ecological factors (vegetation types). These different recognizing approaches are presented and discussed.

différentes méthodes d'identification et de dénomination basées sur des caractères analogiques et imitatifs (morphologique, gustatif, olfactif, onomatopée, etc.). Le système Malinké tient compte de caractères botaniques et de facteurs écologiques (types de végétation).

Ces différentes approches de reconnaissance sont présentées et discutées.

AMOUGOU Akoa & MBOLO

Université de Yaoundé I, Faculté des Sciences, Yaoundé, Cameroun

[Lecture - AREAS1]

Etat de la recherche botanique et floristique dans la Réserve de la Biosphère du Dja

De nombreux travaux de recherche, entre autres des inventaires botaniques, floristiques, écologiques, phénologiques et ethnobotaniques ont été réalisés ou sont menés dans la Réserve de la Biosphère du Dja. Du point de vue institutionnel, ces travaux se font sous l'égide des organismes étatiques (universités, instituts divers), des ONG et programmes nationaux et internationaux.

Faute d'une action concertée entre ces différents intervenants, nous essayons de faire le point des résultats obtenus depuis quelques années pour mettre en évidence les efforts fournis pour la connaissance botanique de la Réserve.

Vladimír ANTONÍN

Moravian Museum, Brno, Czech Republic

[Lecture + Poster - MACRO1]

The genus *Marasmius* sect. *Globulares* in tropical Africa (a preliminary report)

Species of the genus *Marasmius* belong to the most common and the most important saprophytic fungi in tropical regions. The section *Globulares* is the second largest one (after the sect. *Sicci*) within the genus. A preliminary monographic report on this section is given. It is based on studies of type and other specimens from the herbarium BR and GENT, and the author's own collections from Benin, West Africa. This report represents a part of the monographic studies on tropical African species of this genus.

Michel ARBONNIER

CIRAD-Forêt, Programme Forêts Naturelles, Montpellier, France

[Poster - SYST4]

Contribution à l'étude des Orchidaceae du Burundi

Des Orchidaceae recueillies au Burundi par l'auteur entre 1990 et 1993 ont permis d'avoir une meilleure connaissance sur leur diversité et leurs biotopes. Un bilan des espèces trouvées au Burundi est fait à partir de ces récoltes et de l'ensemble de la bibliographie et des herbiers existants. Le nombre d'Orchidaceae observées au Burundi est maintenant de 254 espèces et variétés dont toutes ne sont pas encore décrites. Les espèces sont replacées dans leurs zones phyto-géographiques et leurs niveaux d'altitudes. La carte de répartition des zones phyto-géographiques au Burundi est discutée et modifiée.

Robert H. ARCHER

National Botanical Institute, Pretoria, South Africa

[Lecture - SYST1]

Taming *Euphorbia*: subgeneric classification in Africa

Euphorbia is a very large and variable group of plants with ca. 2000 species. In Africa, one of its centres of distribution, it is astonishingly diverse in growth form, flower and habitat. Because of this diversity and the shifting structure of the cyathium, no attempt to subdivide *Euphorbia* into smaller, more manageable genera has been entirely successful or complete. Such treatments are often confined to a limited geographic area, and occasionally break down when applied to related species from other areas. The use of intrageneric classification

in *Euphorbia* is advocated. Ten of the proposed twelve subgenera occur in Africa and are briefly discussed. A new subgenus, *Medusea*, is a singular group consisting of ± 50 species endemic to southern Africa.

Trevor ARNOLD

National Botanical Institute, Pretoria, South Africa

[Poster - FLOR4]

PRECIS and SABONET: Computerising the plant diversity of southern Africa

Abstract not received.

Myriam AYICHEDEHOU

Laboratoire de Botanique systématique et de Phytosociologie, Université Libre de Bruxelles, Belgique

[Poster - AREAS2]

Analyse phytogéographique de la flore messicole et postculturale du Sud et du Centre-Bénin

La zone étudiée se situe entre les latitudes 6° 20' et 9° 12' Nord et entre les longitudes 1° 41' et 3° 70' E. Elle regroupe les sites de Sèmè, Pahou, Grand-Popo sur le littoral, les plateaux de Pobè, Abomey, Allada, Aplahoué, la dépression de la Lama dans la partie sublittorale jusqu'à 7°, et enfin les sites de Dassa, Bassila, Bétérou dans le Centre-Bénin entre 7° et 9° 12' latitude Nord. Les zones littorale et sublittorale sont caractérisées par un climat subéquatorial à deux saisons pluvieuses et deux saisons sèches. Quant aux sites du Centre-Bénin, ils sont caractérisés par un climat tropical sub-humide à une saison sèche et une saison humide.

Ces sites prospectés diffèrent les uns des autres par leurs reliefs, leurs latitudes et leurs pluviométries, leurs sols et leurs végétations. Ceci explique les variations des types phytogéographiques. Le sud et le centre du Bénin couvrent trois territoires phytogéographiques proposés par White (1983). Ce sont: le Centre régional d'endémisme guinéo-congolais, le Centre régional d'endémisme soudanien, la zone de transition régionale guinéo-congolaise/soudanienne. Sur le plan local, selon Adjanonhoun et al. (1989) les sites prospectés occupent trois districts phytogéographiques: la zone littorale, la zone à affinités guinéo-congolaises au sud jusqu'à 7° N et la zone guinéo-soudanienne au centre jusqu'à 9° 12' latitude N.

L'analyse phytogéographique des 182 relevés réalisés dans les onze sites du sud et du centre-Bénin pour la flore messicole, a permis de recenser 573 espèces dont 155 ligneux (soit recrûs ou plantules) et 418 espèces herbacées. Il montre la prédominance des espèces à large amplitude qui représentent 43% du spectre brut de la flore totale. Les espèces soudano-zambéziennes viennent en seconde position avec 30%, suivies par les espèces guinéennes avec 16% et les afro-tropicales avec 12%. La prédominance des espèces à large amplitude s'explique par l'envahissement des milieux naturels par des adventices de cultures à la suite de l'action anthropique.

L'analyse globale des spectres bruts des ligneux et des herbacés en fonction des sites étudiés montre une variation marquée des types soudano-zambézien et du guinéen. La représentation du soudano-zambézien dans le spectre brut qui vaut 30% de la flore totale, varie de 15% à Aplahoué au Sud à 39% à Bétérou au Nord. On observe une augmentation progressive de cet élément du Sud au Nord. Quelques espèces soudano-zambéziennes herbacées remarquables sont: *Andropogon gayanus* var. *bisquamulatus*, *A. tectorum*, *Hyparrhenia rufa*, *Dissotis senegambiensis*, *Vernonia pumila*, *V. nigritana*, *Aneilema paludosum*, *Crotalaria calycina*, *Sebaea pumila*; comme espèces ligneuses on peut citer: *Cassia sieberiana*, *Combretum adenogonium*, *Uapaca togoensis*, *Vitex doniana*, *Detarium microcarpum*, *Parkia biglobosa*, *Lannea barteri*, *Khaya senegalensis*.

Quant aux espèces guinéennes, on observe une variation croissante d'Ouest en Est entre les zones à faibles précipitations (Grand-Popo 12%, Aplahoué 15%) et les zones à fortes précipitations (Sèmè 18%, Pobè 20%). Les principales espèces ligneuses rencontrées sont: *Milheia excelsa*, *Antiaris toxicaria*, *Dialium guineense*, *Albizia ferruginea*, *A. zygia*, *Cola gigantea*, *Trichlisia subcordata*, *Sorindeta warneckeri*. Comme espèce guinéenne herbacée, citons *Aneilema beninense*.

Les proportions des types phytogéographiques de la flore messicole observées dans les onze sites du Sud et Centre-Bénin peuvent s'expliquer en faisant référence d'une part aux variations climatiques observées selon la latitude et d'autre part aux anciennes formations végétales qui prédominent dans ces zones (forêts denses et savanes guinéennes au sud et forêts claires et savanes soudanennes au centre) et enfin aux phénomènes du gap Dahoméen.

Amadou Tidiane BA

[Poster - VAR1]

Dép. de Biologie végétale, Université de Dakar, Sénégal

Flore, végétation, biodiversité et gestion durable des ressources biologiques dans le delta de Saloum (Sénégal)

Le Delta du Saloum (Sénégal) est un parc national en même temps réserve de la biosphère. A cause de sa richesse en ressources halieutiques (poissons, crustacés, coquillages) la densité de population est relativement élevée et les pressions anthropiques sont très fortes notamment sur la mangrove mais surtout aussi sur des essences guinéennes (*Pterocarpus erinaceus*, *Prosopis africana*...) qui sont des reliques dans cette zone sahélo-soudanienne. La conservation des écosystèmes et de ces espèces constitue l'objectif majeur dans la politique de gestion de cette zone.

H.J. BEENTJE & S. SMITH

[Lecture - FLOR3]

The Herbarium, Royal Botanic Gardens, Kew, U.K.

F.T.E.A. and after

The Flora of Tropical East Africa has been published in family fascicles since 1952, and is to be finished by 2006. Over 12,000 species in 247 families will be treated. This relatively small part of Africa has a range of highly diverse habitats, which results in high biodiversity. A brief overview of habitats and endemism is given.

The second section of the presentation deals with the strategy of the flora: its raison d'être, its use and its users. The future of the flora, and possible flora projects after its conclusion, will be discussed.

H.J. BEENTJE & S. SMITH

[Poster - FLOR3]

The Herbarium, Royal Botanic Gardens, Kew, U.K.

Progress on the Flora of Tropical East Africa

An overview of ongoing work on the Flora will be presented.

A.J. BEAUMONT¹, T.J. EDWARDS¹, F.R. SMITH² & J. VAN STADEN³

[Poster - SYST1]

¹ School of Botany and Zoology, University of Natal, Pietermaritzburg, Scottsville, South Africa² Department of Botany, University of Durban-Westville, Durban, South Africa³ Research Centre for Plant Growth and Development, University of Natal, Scottsville, South Africa**Leaf and bract diversity and phylogeny of *Gnidia* (Thymelaeaceae)**

Gnidia L. (Thymelaeaceae) is represented by ca. 140 species which occur in southern and eastern tropical Africa, Madagascar and India. Southern Africa is home to more than 100 species of this genus, and the southern Cape is the centre of species diversity.

Gnidia plants are small to medium shrubs, or rarely small trees. Leaves are simple, and involucrial bracts occur in most species and resemble leaves or are highly modified.

The generic limits of *Gnidia* are controversial. Species were previously assigned to allied genera, usually on the basis of floral features. These floral features however, gained notoriety for their variability, to the extent that confidence in their taxonomic value has fallen. Cautious opinion currently favours the inclusion of all species under the genus *Gnidia*.

Within the broad circumscription of *Gnidia*, there is no sub-generic structure, and species relationships are poorly understood. This work forms part of a study to investigate morphological and anatomical characters in this genus in generating a cladistic assessment of the genus. Leaves and bracts of *Gnidia* species are diverse and potentially useful in systematic studies. This work focuses on morphological and anatomical studies, and assesses the diversity and evolution of leaves and bracts within infrageneric groups of *Gnidia*.

Surface details of fresh and herbarium dried leaves and bracts of selected species were examined using Light Microscopy and Scanning Electron Microscopy. Intraspecific and interspecific variation of leaves and bracts based on logarithmic transformations of linear data, was performed using Univariate Nested Analyses of Variance and Univariate Analyses of Variance. A Correlation Analysis was performed to test the correlation between leaf and bract ratios within species. Interspecific variation was examined further using Canonical

Analysis of Variance to maximise the separation of species on the basis of leaf and bract dimension data. Cladograms from vegetative and floral morphological and anatomical data were generated using Hennig '86. Consensus trees were used to establish infrageneric groups.

Results suggest that infrageneric groups in *Gnidia* can be identified. Homogenous groups of species are identified on the basis of their similarity of leaf length/width or bract length/width ratios. The species comprising the homogeneous groups for leaf ratios are different to the species comprising the homogeneous groups for bract ratios. There is no correlation between leaf and bract ratios. Newly observed features of leaves and bracts include: hair ornamentation; specialization of stomata; aerenchymatous-like tissue and reduced mesophyll. Leaf, bract and floral diversity in *Gnidia* appears to be driven by different environmental constraints.

BELEM Mamounata Ouedraogo

[Lecture - AREAS1]

Département Productions Forestières, INERA/CNRST, Ouagadougou, Burkina Faso

Diversité floristique de deux forêts galeries de la Réserve Biosphère de la Mare aux Hippopotames (Burkina Faso)

Notre étude se situe dans un thème global de travail intitulé «Diversité Biologique et Ethnobotanique de galeries forestières de l'Ouest du Burkina Faso»; Dans ce travail, nous voulons comparer la diversité biologique végétale, la structure, la dynamique et la production de 6 différentes forêts galeries du pays.

La présente étude concerne les caractéristiques floristiques de deux galeries de la Réserve Biosphère de la Mare aux Hippopotames, la Leyessa et Bala.

Un plot permanent d'un hectare a été installé dans une partie représentative de chaque galerie forestière. Le plot est subdivisé en 100 placeaux de 10 mètres carrés chacun. Chaque arbre de plus de 5 cm de DHP (Diamètre à Hauteur de Poitrine) est étiqueté par une plaque aluminium portant son numéro. Pour chaque arbre, les coordonnées géographiques, la hauteur et le DHP > à 5 cm à 130 cm de hauteur sont notés. Les observations comme arbre coupé, arbre couché, arbre mort, arbre brûlé en partie sont notées.

Nous avons dressé pour chaque forêt la liste des arbres de DHP > à 5 cm. Les deux plots regorgent 851 individus d'arbres de DHP > à 5 cm, repartis en 35 espèces, 32 genres et 21 familles. Six grandes familles se dégagent de cette étude: les Bombacaceae, les Caesalpiniaceae, les Sterculiaceae, les Combretaceae, les Verbenaceae et les Boraginaceae.

La diversité relative, la densité relative, la dominance et la «Family Importance Value» de chaque famille sont calculées pour chacune des forêts.

Au point de vue diversité, la forêt de Bala avec 461 arbres repartis en 29 espèces et 21 familles est plus riche que la forêt de la Leyessa qui compte 392 arbres appartenant à 25 espèces et à 17 familles.

D.U. BELLSTEDT¹, H. P. LINDER² & E.H. HARLEY³

[Lecture - SYST3]

¹ Biochemistry, University of Stellenbosch

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Phylogenetic relationships in the Disinae based on non-coding trnL-trnF chloroplast sequences: evidence of numerous repeat regions

The *Disinae* include a number of genera of predominantly African orchids, with *Disa* being the most speciose, consisting of some 150 species, some of them spectacular floristically and therefore with horticultural potential. For studies of relationships especially within genera there is a shortage of well defined morphological loci with sufficient variability to provide phylogenetically useful information. The aim of the project was to identify whether sufficient variation existed within the chloroplast trnAL intron and the trnAF-trnAL spacer regions to be phylogenetically informative at the species level and whether this could then be used to establish the relationships between the numerous species in the genus. DNA was isolated from the leaves of 50 taxa of *Disa* and related outgroups, and PCR was used to amplify the trnL intron and trnL-trnF spacer regions of the chloroplast genome. These regions were then sequenced using automated sequencing, aligned and the phylogenetic relationships between the taxa determined using parsimony and distance analysis.

methods. It was found that sufficient variation existed within these regions in the genus *Disa* to be phylogenetically informative. Although some single base changes were autapomorphic, others provided phylogenetically informative information. There were a number of regions with tandem repeats in the trnL intron in more than one species which appear to be unique to the genus *Disa*. Evidence that these regions can form secondary structures involved in the splicing reaction to remove the intron will be presented. The tandem repeats also appear to be phylogenetically informative, and an approach to extract the maximum information from such data will be presented. The dendrograms produced showed relationships between some taxa which were congruent with the morphologically derived tree, but other species grouped in unexpected positions sufficiently strongly to suggest that the classical phylogeny needs revision.

Jean Lagarde BETTI

[Poster - PLANT1]

Laboratoire de Botanique systématique et de Phytosociologie, Université Libre de Bruxelles, Belgique

Analyse des plantes médicinales citées comme anti-paludéennes dans la région forestière du Dja au Cameroun

Le paludisme fait partie des maladies les plus courantes dans la région forestière du Dja. Pour soigner cette maladie, les populations locales ont essentiellement recours aux plantes médicinales. Ce travail vise à relever les plantes confirmées pour leur usage anti-paludéen en thérapie traditionnelle locale d'une part, et à définir pour chacune de ces espèces, un index de vulnérabilité.

Trois types d'enquêtes ethnobotaniques ont été conduites dans la région pour relever les plantes utilisées en médecine traditionnelle par les populations Fang, Kaka, Nzaman et pygmées Baka locales. La première enquête dite **méthode pour la pharmacopée spécialisée** a été conduite auprès des guérisseurs spécialisés en deux reprises, soit en 1995 et 2000. La deuxième enquête ou **méthode pour la pharmacopée populaire** a été menée en 1998 auprès des mères de familles pour la plupart âgées. La troisième enquête a recensé les plantes médicinales présentes dans les jardins de cases.

Pour évaluer l'importance de la commercialisation des plantes médicinales en provenance du Dja, tous les marchés de Yaoundé ont été parcourus. Pour chaque plante, l'organe végétal utilisé, les quantités vendues ainsi que le prix ont été notés. Le choix de la ville de Yaoundé provient du fait que les études ethnobotaniques précédentes avaient identifié cette ville comme le principal point de chute des produits venant des provinces de l'Est, Centre et Sud du Cameroun.

En pharmacopée populaire, nous avons considéré comme confirmées pour leurs usages en médecine traditionnelle locale, celles des plantes citées de la même façon par au moins 20% des 14 matrones ayant donné des informations contre le paludisme; cinq plantes sur les 21 citées ont été retenues. En pharmacopée spécialisée, nous avons retenu comme confirmées pour leurs usages en médecine traditionnelle locale, a) soit celles des plantes citées de la même façon par deux guérisseurs indépendamment de l'année (convergence d'emploi spatiale), b) soit encore celles des plantes citées de la même manière par le même guérisseur à deux reprises, c'est-à-dire en 1995 et 2000 (convergence d'emploi temporelle); treize guérisseurs ont été interrogés, quinze plantes ont été retenues sur les 48 citées. Pour les plantes des jardins de cases, nous avons retenu deux plantes car citées au moins par deux propriétaires. Au total, vingt plantes sur les cinquante citées, ont été retenues comme potentiellement confirmées pour leurs usages contre le paludisme en médecine traditionnelle du sud du Dja.

Un index de vulnérabilité a été défini pour chacune des vingt espèces retenues. Dix critères de vulnérabilité ont été retenus sur base de l'importance d'utilisation (locale, marché), des organes végétaux cités, des caractéristiques floristiques (type phytogéographique, biologie, morphologie, diaspores, habitat) et des densités des plantes dans les jardins de cases et la forêt villageoise. La plupart des plantes citées se comportent bien. Quelques-unes peuvent être considérées comme potentiellement menacées pour leurs usages en médecine traditionnelle.

Très souvent, la plupart des guérisseurs citent des plantes erronées dans le but de camoufler la vraie information. Les travaux réalisés ont permis de contourner ce problème et de mettre en évidence les plantes potentiellement confirmées pour leurs usages contre le paludisme par les populations habitant en périphérie de la réserve du Dja. Sur les vingt espèces retenues, certaines sont largement citées dans la pharmacopée africaine.

pour les mêmes usages. D'autres encore sont confirmées dans la littérature pour leurs vertus contre le paludisme. Deux plantes ne sont pas encore citées dans la littérature pour cet usage.

Si les politiques du code forestier camerounais sont suffisamment claires pour ce qui regarde le contrôle local du bois, de la chasse et tout récemment encore des forêts communautaires, celles en rapport avec les produits forestiers non ligneux de nature végétale restent globalement vagues et mal définies. La définition des index de vulnérabilité permet de développer des systèmes d'alerte précoce, qui sont de véritables outils d'aide à la prise de décision pour la gestion rationnelle des plantes médicinales en particulier, ou encore des produits forestiers non ligneux de manière générale.

Sally BIDGOOD

[Lecture - PLANT1]

c/o The Herbarium, Royal Botanic Gardens, Kew, U.K.

The utilization of plant products and its importance for vegetation conservation in West and South West Ethiopia

At the present time local cultures are changing, even disappearing, through globalisation. With this change many traditional materials are being replaced by plastic and man-made fibres. When woodlands, wetlands and forests are used by local people to collect materials for artefacts, food and medicine there is an inherent interest in conserving these areas. If the need to use the local habitats decline so will the urge of the local people to conserve them. Many countries now want to re-establish their cultural identities. Even if the art of producing artefacts from plant materials is lost, collections within local and international museums can at least show what was previously there. They may also assist future generations to resurrect lost skills.

Marie-José BIGENDAKO

[Poster - VAR1]

Université du Burundi, Bujumbura, Burundi

Stratégies pour l'environnement au Burundi: cas de la biodiversité végétale

Après avoir établi un diagnostic sur l'état des ressources et de l'environnement au Burundi, il a été mis en évidence une grande richesse d'une flore hébergée dans des écosystèmes diversifiés. Mais la situation est alarmante quant à la vitesse avec laquelle les ressources sont exploitées: on observe une régression aussi bien qualitative que quantitative de la flore. Certaines espèces ont complètement disparu, d'autres en voie d'extinction.

Les stratégies sont donc proposées dans le sens d'une optique de conservation et de valorisation.

M. G. BINGHAM

[Lecture - SYST4]

Lusaka, Zambia

Chikanda: the exploitation of edible orchid tubers

Orchid tubers (chikanda) are a traditional food in the higher rainfall areas of the miombo biome. During the past decade, largely as a result of increasing economic hardship, a commercial trade in chikanda has developed. Both wetland and dryland species are harvested. Many areas of northern Zambia and Malawi are now depleted, and there is an urgent need to take stock of remaining resources and to implement conservation measures.

Many different species are exploited, and these are known by different names, but no taxonomic work has been done on the tubers. The genera exploited are those with non-fibrous tubers, mostly *Habenaria*, *Disa* and *Satyrium*.

M. G. BINGHAM

[Poster - AREAS2]

Lusaka, Zambia

Annuals of miombo woodland

The herbaceous ground cover of miombo woodland is rich and varied, consisting predominantly of perennials. In the mature and relatively undisturbed condition annuals are comparatively rare, and when early rains fail

there may be no germination. They are found mostly as pioneers on bare sites, e.g. eroded or compacted sites (including tracks, wallows and the wash zone of termite mounds); excavations; ash patches where fallen logs or stumps have burnt; bare areas under some trees. In the last case allelopathy might be involved.

S.K. BOATENG, S. O. BENNETT-LARTEY & E. A. OSEKRE

[Lecture - PLANT1]

Plant Genetic Resources Centre, Bunso, E/R, Ghana

Ethnobotanical studies on plants in Bunso area (Ghana)

Ethnobotanical studies have been undertaken in Bunso area of Ghana. The area is inhabited mainly by Akims but people from other tribes like Ewes and Krobos have migrated into the area thus enriching the ethnobotanical knowledge. The study was undertaken to document the various uses of plants by people in the area. This was done in order to conserve the plant species in the face of human pressure on land and changes in social values of the youth. The study was carried out using group discussion, informal interviews and structured questionnaire method on groups of practising herbalists and some aged people. In the study, 31 different plant species from 19 families were encountered. Most of the plants were used for medicinal purposes and these covered most of the major diseases found among the rural people. Included in the diseases which the plants are used to treat are waist pains, skin diseases, genito-urinal diseases and those concerned with childbirth and childcare. The uses of plants transcended to non-medicinal uses like preservation of meat. The study revealed several unknown or little known uses of plants in the area which could be of immense benefit.

S.K. BOATENG, S. O. BENNETT-LARTEY & M. O. OPOKU-AGYEMAN

[Lecture - FLOR2]

Plant Genetic Resources Centre, Bunso, E/R, Ghana

Phenological studies of trees in an arboretum at Bunso (Ghana)

The phenology of trees in an arboretum at Bunso, Ghana was undertaken. Half of the area of the 16.5 ha arboretum consists of mainly *ex-situ* conservation of exotic trees and the other half consists of *in-situ* conservation of semi-deciduous tropical forest. The study was restricted mainly to the indigenous trees in the arboretum. Most of the species studied are used as timber, fruit, spice and for medicinal purposes. The study was carried out to document when the trees flower, fruit, shed leaves and/or form new leaves. Five trees of each tree species were selected and observed twice in a week. The study revealed that in most of the 37 plant species studied, flowering and fruiting occurred mostly during the latter part of the dry season, i.e. January to March prior to the onset of the major rains. About half of the species studied underwent shedding and flushing of leaves. Most of the species observed had dull flowers. The information provided could help in knowing the appropriate time for collecting fruits, spices, seeds for tree nurseries and other tree parts for medicinal purposes.

F.J. BRETELER

[Poster - VAR1]

Herbarium Vadense, Wageningen, The Netherlands

Stipules in estipulate families and genera

The stipule character plays an important role in the identification and classification of plants. Their presence or absence is usually constant for a certain family as a whole, but in some families (e.g. Flacourtiaceae, Sapotaceae) it is valid at a lower level, i.e. constant for genera or for species within genera. In some taxa stipules are very small and/or early caducous, hardly leaving trace of their presence earlier. They may easily be taken for estipulate. A few taxa (two families, two genera) will be presented in which stipules are present, but are usually described as estipulate.

A.-M. BÜRGER

Botanical Museum and Library, University of Copenhagen, Denmark

[Poster - FLOR4]

The distribution of African savanna plants using WorldMap

Data from available distribution maps of 556 taxa of African savanna plants south of 20 degrees North have been recorded in WorldMap v. 2 together with a range of environmental parameters. Maps are presented of species and family richness, as well as ratio species/family. Connections between species richness and environmental factors such as altitude, temperature, precipitation and fire-frequency are analysed.

P.M. BURGOYNE

National Botanical Institute, Pretoria, South Africa

[Poster - SYST1]

Systematics of *Acrodon* (Mesembryanthemaceae): what defines this genus?

Since the establishment of the genus *Acrodon* in 1927 by Brown and the consequent transfer of some species of *Ruschia* to *Acrodon* by Glen in 1986, three more species have recently been added to this genus, one by Hartmann and two by Burgoyne. The last mentioned two additions to *Acrodon* have previously resided in the genus *Ruschia* (*R. purpureostylus*, later placed in the genus *Cerochlamys* by Hartmann, and *R. promontorii*, mistakenly placed in the genus *Amphibolia* by Hartmann). The genus now comprises six species.

The distribution and characters defining the genus are discussed and possible relatives are pointed out. A key to the species currently classified in *Acrodon* is given and some nomenclatural problems experienced in the past are cleared up.

P.M. BURGOYNE¹, S. KRYNAUW² & G.F. SMITH¹

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² Mpumalanga Parks Board, Lydenburg, South Africa

[Poster - VAR1]

Population studies and new conservation status for species of the genus *Frithia* (Mesembryanthemaceae)

Recent studies have shown that the mesembryanthemoid genus *Frithia* N.E.Br. formerly thought to be monospecific, now comprises two species, *F. pulchra* N.E.Br. and *F. humilis* P.M.Burgoyne. The distribution of these two species is disjunct, both being confined to specific areas in the summer-rainfall region of South Africa. *F. pulchra* is found in the North-West Province in the vicinity of Rustenburg, while *F. humilis* occurs in the Gauteng and Mpumalanga Provinces between Bronkhorstspuit and Witbank.

Until recently the conservation status of the broadly circumscribed, but still comparatively localised *F. pulchra* was regarded as rare.

In this study, areas where the two presently recognised species grow, were visited and all known sub-populations and localities were noted. The number of individuals in each sub-population was estimated and the conservation status of both species was determined using the current IUCN threatened plant categories.

In addition, the number of mature and juvenile plants found in each sub-population was determined showing the demographics of these minute, highly endemic, leaf succulents.

R.W. BUSSMANN

Fundación Científica San Francisco, German office / Department of Plant Physiology, University of Bayreuth, München, Germany

[Lecture - AREAS3]

Succession and regeneration patterns of East African mountain forests

The regeneration processes of the main montane forest types of Eastern Africa (Kenya, Ethiopia) were investigated.

The slowly growing camphor tree, *Ocotea usambarensis*, the species heavily logged for timber, regenerates mainly by suckers from old root systems. Undamaged seeds were very rarely seen, and apparently are viable only for a few days, like seeds of other Lauraceae. After natural breakdown of an old tree, the gap is filled by fast growing species of the Euphorbiaceae, mainly *Macaranga kilimandscharica* and *Neoboutonia macrocalyx*, in the shade of which the young *Ocotea* suckers can establish. After the death of the secondary

species, whose germination requires full sunlight and is inhibited in the shade, the *Ocotea* forest recovers. Large scale logging of Camphor trees predominantly destroys the various regeneration stages of *Ocotea* and leads to secondary forest types, which regenerate in own cycles, dominated by the named Euphorbiaceae species. The high number of big game was found to be without impact on the natural regeneration of the *Ocotetea usambarensis*.

Juniperus procera, the Pencil-cedar, and naming species of the *Juniperion procerae*, regenerates most efficiently after fire. Without recurrent burning, the forests of the lower and middle part of the montane zone, apparently regenerate to climax associations dominated by broad-leaved trees as *Olea capensis* ssp. *hochstetteri* and *Olea europaea* ssp. *cuspidata* and the unique conifer *Podocarpus latifolius*. On higher altitudes, the *Myrsino africanae* - *Juniperetum procerae* is found, where *Juniperus procera* always remains dominant even if fire does not occur for a longer time period. The high population density especially of buffalos seems to inhibit successful regeneration in many parts of the *Juniperion*, due to intensive browsing and in particular trampling.

The African Bamboo, *Sinarundinaria alpina*, shows a distinct growth cycle and grow for extremely long periods in the vegetative state before flowering, especially so at the borders of its area. After flowering and dying of the bamboo, a dense *Sambucus africana* shrub is formed into which bamboo is invading from old rhizomes again. In the dry North of Mount Kenya it could be demonstrated that even in areas where local people could not remember any form of bamboo in their lifetime, new shoots develop from old rhizomes. This indicates an extraordinary long interphase between two bamboo cycles in the drier regions of the mountain.

The uniform age of the *Hagenia* stands suggests that regeneration occurs suddenly after a disturbing event. Germination tests yielded, that *Hagenia* seeds are not germinating unless the competing undergrowth is removed. As fire is the only natural factor able to clear the grass layer of larger areas, it is assumed, that the reproduction of the subalpine forests depends on occasional burning. Pieces of charcoal, found in each of the seven soil profiles dug around Mt. Kenya, could be interpreted as a clear evidence of former burning of these forests. Strikingly, fire seems not only to be decisive of removing under- and aboveground competition, as well as the dense leaf litter, but also of stimulating the germination process with a sudden heat surplus.

According to these observations, a cyclic regeneration after burning is proposed for the mixed *Hagenia* - *Juniperus* forests (*Hagenio abyssinicae* - *Juniperion procerae*). In the *Hagenio abyssinicae* - *Hypericion rotundifolium*, however, no distinct succession stage after fire could be differentiated and further research in recently burnt areas is necessary, to clarify, if the pure *Hagenia* stands are following the same reproduction cycle.

Matt H. BUYS¹ & J.J.A. VAN DER WALT²

[Poster - SYST1]

¹ A.P. Goossens Herbarium, Potchefstroom University for CHE, School for Environmental Sciences & Development, Botany Division, South Africa

² University of Stellenbosch, Department of Botany, South Africa

***Lobostemon* (Boraginaceae): the value of flowers and inflorescences**

The systematic value of the flowers and inflorescences of *Lobostemon* Lehm. was investigated as part of a revision of the genus. Fixed as well as fresh material were used for dissecting flowers. Observations of the inflorescence morphologies were made from herbarium specimens as well as individuals in the field. The flower morphology provided good diagnostic characters for sectional delimitation. Previous authors considered section *Lobostemon* to be basal due to presence of actinomorphic flowers. This study has indicated the reverse. The reduced spike like inflorescence in section *Argentei* Levyns shows similarity with *Pontechium* Böhle & Hilger, the sister taxon to *Lobostemon*. The formation of the typical cincinnus inflorescence in *Lobostemon* is postulated by means of a shortening of the peduncle associated with an increase in the number of flowers per cymule.

Benny BYTEBIER

East African Herbarium, National Museums of Kenya, Nairobi, Kenya

[Poster - SYST4]

The Orchids of Mount Tshiaberimu

Mount Tshiaberimu stands at the North West corner of Lake Edward in the Virunga National Park, Democratic Republic of Congo. It is situated along the Westbanks of the Albertine Rift Valley, a biodiversity hot-spot and an area with a high endemism in fauna and flora.

Between 4 and 10 July 1997, an orchid inventory was conducted here, as part of a wider biodiversity survey, financed by the Dian Fossey Gorilla Fund.

The study extended the number of known orchids for the area from four to sixteen species. Six are terrestrial and ten are epiphytes. While all terrestrial orchids collected were common and widespread, the epiphytic species proved to be very interesting.

Eight out of ten species belong to the genus *Polystachya*.

Five species are endemic to the area. *Polystachya poikilantha* var. *leucorhoda*, *P. angustifolia*, *P. tenella* and *P. vulcanica* var. *vulcanica* are all known from few collections. *Diaphananthe burtii*, another endemic, is only known from three collections, two from Rwanda and one from the DRC.

Stolzia williamsonii is newly recorded for the floral area (Congo, Rwanda, Burundi). This species was previously only known from Southern Tanzania and Malawi.

Recommendations for the conservation of Mount Tshiaberimu's unique fauna and flora are outlined.

Benny BYTEBIER¹ & T. PEARCE²

[Lecture - FLOR4]

¹ East African Herbarium, National Museums of Kenya, Nairobi, Kenya

² Royal Botanic Gardens, Kew, Seed Conservation Section, Ardingly, West Sussex, UK

The role of a herbarium and a herbarium database in supporting plant species conservation

In addition to providing voucher specimens for identification purposes, the potential for the herbarium to provide rather more complex information on distribution, phenology, ethnic uses, etc. is often hidden due to the tedious nature of manually browsing large numbers of sheets and manually recording the data that is found therein.

Much progress has been made in the field of computerisation of herbarium collections. This has provided tremendous potential to extract, manipulate and see patterns in distribution for example, that would have taken many long hours of manual browsing to find. However, care should be taken that computerisation of herbarium data is not somehow construed as improving the quality of the data. If the data is of high quality then computerisation is frequently a worthwhile exercise, computerising poor quality data will result in poor quality inferences.

A case study of the specimen databasing efforts of the Plant Conservation Programme of the East African Herbarium will be described. A comparison will be made between a small scale project (*Kalanchoe* in Crassulaceae) and a big scale project (Orchidaceae). The different steps in setting up a specimen database will be identified, the pitfalls will be discussed and, based on our experience, recommendations for similar projects in other tropical herbaria will be made.

The use of the database in prioritising species for conservation will furthermore be discussed.

Clinton CARBUTT & Trevor EDWARDS

[Poster - PHYTO1]

School of Botany and Zoology, University of Natal Pietermaritzburg, Scottsville, South Africa

Cape elements on high altitude corridors and edaphic islands: phytogeography

The heathy, sclerophyllous vegetation type known locally in South Africa as fynbos is not merely restricted to the Cape Floristic Region (CFR), but also occurs throughout sub-Saharan Africa, Madagascar and the Mascarene Islands in cool, montane environments where rainfall is high and soils are highly leached. These fynbos-like shrublands include many 'typical' fynbos genera and growth forms. The superficial resemblance of such landscapes with the CFR, especially those along the high altitude eastern corridor extending up towards tropical East Africa, has prompted much discussion yet little study.

Preliminary phytogeographical (floristic) analyses have highlighted 77 genera as having a marked centre of radiation in the CFR, as well as forming a major component of the Drakensberg and Pondoland floras. Of this total, 52 genera are common to both phytochorial domains, whereas a meagre ten genera are Cape elements shared only with the Drakensberg and fifteen genera are Cape elements shared only with Pondoland. The strong similarities in floristic composition shared between the Drakensberg and Pondoland floras indicates some form of analogy in plant growth environment. Genera were further grouped according to family, habitat and life history. The most representative families comprising the highest numbers of typical Cape genera shared between the Drakensberg and Pondoland floras are the Asteraceae, Scrophulariaceae, Iridaceae, Fabaceae and Orchidaceae. More specifically, typical Drakensberg Cape genera are represented by the Poaceae, Iridaceae and Asteraceae, whereas the most significant Cape genera restricted to Pondoland occur within the Proteaceae and Fabaceae. In terms of habit and life history, Cape genera limited to the Drakensberg comprise mainly ericoid, geophytic or mesic herbs and fewer shrubs. Pondoland Cape elements are most strongly represented by mesic shrubs, followed by ericoid and geophytic herbs and few trees. Cape genera shared between the domains comprise mainly ericoid, geophytic and mesic herbs, followed by shrubs. Arborescent taxa contribute an insignificant total. The incidence of succulence is also poorly represented throughout.

Floristic patterns are congruent with environmental gradients across South Africa. A SW-NE gradient across South Africa of increasing altitude, increasing rainfall and decreasing temperature corresponds with an increase in the number of Cape genera with increasing distance from the CFR. It is not certain whether this scenario holds true for the high altitude areas extending into tropical East Africa. Further attention may contribute to phytogeographic hypotheses explaining migration routes due to climate change and subsequent range expansions and contractions.

Clinton CARBUTT ¹, Trevor EDWARDS ¹, Richard BECKETT ¹ & Richard FYNN ²

[Poster]

¹School of Botany and Zoology, University of Natal Pietermaritzburg, Scottsville, South Africa

[PHYTO1]

²School of Applied Environmental Sciences, University of Natal Pietermaritzburg, Scottsville, South Africa

Cape elements on high altitude corridors and edaphic islands: nutrient dynamics & nutrient-driven colonization

Montane floras are inherently subjected to numerous stresses, namely high incident levels of ultraviolet (UV) radiation, marked temperature fluctuations, limited growing seasons and high levels of evaporation. Similarly, Cape fynbos and Pondoland Sandstone floras have evolved under sub-optimal conditions, the limiting factor being nutrient poor substrates. A preliminary investigation into the repeated occurrence of Cape-centred taxa in distant montane and sandstone floras is being undertaken using a novel, mechanistic approach whereby the concept of morphological and physiological preadaptation is invoked. The central hypothesis aims to prove that an *in situ* preadaptation to one particular stressful environment is beneficial to taxa colonizing distant areas simulating similar stress levels via alternative environmental factors, thereby initiating a similar growth response.

Pot trials have been undertaken at Pietermaritzburg to examine the influence of soil type on growth rates using the herbaceous perennial *Dielsia mollis* (Scrophulariaceae). Rooted cuttings established and grown in Drakensberg, Pondoland Sandstone and Midlands derived soils were harvested after a 120 day growth period. Distinct morphometric differences were observed, with cuttings established in the Drakensberg soil appearing stunted. This dwarfing response is peculiar, since a soil analysis revealed that the soil is highly fertile. The Midlands soil type generated the most prolific growth, followed by the Sandstone soil type. The Kjeldahl nitrogen (N) determination method was utilized to determine leaf N levels, which are highest in the 'Drakensberg variety', and least in the 'Sandstone variety'. Total soil N values corroborated the leaf N levels with the Drakensberg soil type yielding extremely high N levels and the Sandstone soil type yielding extremely low N levels. This experiment will be repeated with the addition of trials established in both the Drakensberg and Pondoland environments.

It is hypothesized that the high organic matter content of Drakensberg soils, potentially yielding high N levels in the soil is poorly obtainable due to the cooler temperatures and slower rates of metabolism associated

with high altitudes. The resultant slower rates of mineralization yield an overall low N availability (and hence an overall nutrient poor environment). However, the constant-environment utilized at low altitude is associated with an increase in temperature, thereby resulting in elevated N mineralization and diffusion, with an overall increase in soil N availability to plants. The low soil pH/high acid saturation of soils high in organic matter such as those of the Drakensberg result in high aluminium levels. At this point we have not differentiated between N and Al toxicity (or a combination of both). A separate trial will be run growing an Al-tolerant strain of *Avena* in the same three soil types to help differentiate between N and Al toxicity. Available soil N and *in situ* mineralization trials for each soil type will also be undertaken.

Opportunist colonization of high altitude corridors is therefore favoured because the soil-environment continuum favours a system which is analogous to the Sandstone-type substrates common to both the Cape Floristic Region (CFR) and Pondoland.

L. CATARINO, M. C. DUARTE & M. A. DINIZ
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[Poster - VAR1]

Vascular aquatic plants in Guinea-Bissau: an overview

The geomorphologic and climatic features of Guinea-Bissau are responsible for the presence of various types of wetlands. Most of this territory has an altitude below 40 m and the coastline is very curvaceous.

Lagoons, ponds and temporary pools, floodplains, rivers and streams, fresh-water and brackish swamps are some of the significant habitats where a particular aquatic and riparian vegetation develops.

Based on the author's field work and herbarium records a first survey of the wetland flora in Guinea-Bissau has been attempted. Preliminary results pointed to the presence of more than one hundred species of about thirty families in these ecosystems.

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[Lecture - PHYTO1]

Phytogeographic framework of Guinea-Bissau

Guinea-Bissau is included in the Guinea-Congolia/Sudania regional transition zone. In spite of being a small country, it is not a phytogeographically uniform territory, showing some significant differences in flora and vegetation from north to south and from coastal to inland regions.

The available data on the geological, pedological and climatic features of the Guinea-Bissau territory have been summarized and related with the floristic and vegetational data, in order to characterize the phytogeography of this country.

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[Poster - SYST1]

Study of five Afro-alpine *Aspleniums* from Ethiopia

The vegetation of the upper parts (2000-6000 m) of the high East African mountains (Mt. Batu, Elgon, Kilimanjaro, Mt. Kenya, Ruwenzori, ...) includes several very similar *Asplenium* taxa [*A. actinopteroides* Peter, *A. aethiopicum* (Burm.f.) Bech., *A. buettneri* Hieron., *A. decompositum* Peter, *A. demerkense* Hieron., *A. goetzei* Hieron., *A. kassneri* Hieron., *A. lademannianum* Rosenst., *A. majus* (Hieron.) Pic.Ser., *A. mildbraedii* Hieron., *A. praegracile* Rosenst., *A. simii* A.F.Braithw. & Schelpe, *A. stipicellatum* Pic.Ser., *A. uhligii* Hieron. and *A. volkensis* Hieron.]. To identify these taxa with a shared and variable gross morphology we studied their micromorphology and cytology, and use biometric methods to find more reliable characters for their identification. Another major objective is to discover their relationships and to pinpoint possible ancestral (diploid) taxa.

During several field trips in eastern Africa we took photographs of the ferns and their habitats, collected spores and fixed young sporangial material in 1:3 acetic alcohol. In January 1998 we explored the administrative regions of Arsi, Bale, Hararge, Shewa and Sidamo in Ethiopia, and found five members of this group: *A. aethiopicum*, *A. buettneri*, *A. demerkense*, *A. uhligii* and *A. stipicellatum*. From herbarium material small pieces of pinnules were stained with Ruthenium red to study epidermal leaf characters such as false

The conclusion supported is that the West African montane flora is the poor relation of that of eastern Africa and mostly consists of a comparatively small subset of eastern African montane species. Some of these were formerly considered West African endemics but have since been shown to be conspecific with East African species.

However, there is also a significant genuine endemic element to the West African montane flora. The endemic element is dominated by taxa that appear to have migrated relatively recently from eastern Africa, and to have speciated along the way, or after their arrival in West Africa. These taxa are typically accorded subspecific or specific status and can be termed neoendemics. A smaller proportion of the endemic element are palaeoendemics. These are often accorded subgeneric or generic rank, sometimes have relictual distribution, and may have no obvious near relatives in eastern Africa.

This picture is complicated in West Africa by amphi-Congo basin montane taxa such *Ternstroemia polypetala* which appear relictual in both West and East montane Africa, and also by the presence of taxa of presumed European origin, such as *Succisa trichotocephala*.

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[Poster -PHYTO1]

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The flora and phytogeography of Western Cameroon

Western Cameroon, as delimited by the Cross River - Sanaga River interval, has one of the richest lowland and submontane forest floras in Tropical Africa.

This paper reviews the history of, and future prospects for botanical inventory work in the area. The integrity of Western Cameroon as a phytogeographic unit is examined. Is it a real entity? Evidence supporting the integrity of this unit is:

1. The presence of endemic genera that are confined to the CR-SR interval, such as *Medusandra*, *Calochone*, *Dielsantha* and *Nematonema*.
2. The absence from the interval of such conspicuous species as *Podococcus barteri* which occurs both West of the Cross River and East of the Sanaga, but not in between.
3. The concordance with zoogeography, e.g. the restriction of primates such as Drill (*Pandrillus*) to the interval.

Threats to the survival of the flora of Western Cameroon are assessed and possible species extinctions are listed.

Augustine Charles CHIKUNI

[Lecture - SYST1]

National Herbarium & Botanic Gardens of Malawi, Zomba, Malawi

Geographical variation of *Brachystegia tamarindoides* complex

Nine taxa whose circumscription fall within the broad concept of *Brachystegia tamarindoides* have been described since its publication. However, based on number, size and shape of leaflets these have been grouped into four species (*B. tamarindoides*, *B. microphylla*, *B. glaucescens* and *B. torrei*) in recent taxonomic treatments although taxonomic limits within the complex are not well defined. Canonical Discriminant Analysis of the morphometric data showed that the four taxa were geographically and ecologically isolated, but they intergrade into each other in terms of number, size and size of leaflets, bark surface pattern and floral characters. This indicates that there are no supporting characters to recognise the four taxa at specific rank. In this study the four taxa were grouped into three intraspecific taxa as follow: *B. tamarindoides* subsp. *tamarindoides*, *B. tamarindoides* subsp. *microphylla* and *B. tamarindoides* subsp. *torrei*. *Brachystegia glaucescens* is reduced into synonymy with *B. tamarindoides* subsp. *microphylla*.

G. Philip CLARKE
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[Poster - PHYTO1]

The Lindi local centre of endemism

Botanical collections have been carried out from the plateaux inland of Lindi in SE Tanzania since Dr. Walter Busse first visited the area in 1903. The area encompassed by these plateaux is now considered to be the richest part of the Swahilian regional centre of endemism. The forest on these plateaux are known to contain over one hundred vascular plant endemics which are not found in the forests immediately outside the area. Most of the endemics have been collected less than three times, and there is a relatively low overlap between the geographical distributions of these endemics. This may partly be an artefact of altitudinal zonation and low overall collection intensity in the area. The full extent of the surviving remnants of forest is still poorly known, and an increased conservation initiative in this area is urgently required, together with further biological studies.

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[Poster - FLOR2]

Floristic analysis of miombo woodland in Huíla (Angola)

Abstract not received.

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[Lecture - FLOR4]

Base FLOTROP et caractérisation de la biodiversité des pâturages sahéliens

Les auteurs commencent par un bref rappel des notions de diversité, puis, s'attachant successivement à la diversité alpha d'ordre nul (richesse spécifique d'une station) et la diversité gamma d'ordre nul (richesse spécifique régionale), ils montrent comment ces notions sont abordées par le logiciel de la base FLOTROP, puis ils examinent la variabilité des résultats obtenus et les origines des incertitudes notées.

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[Poster - AREAS4]

The tribe Pavetteae s.l. (Rubiaceae) in Madagascar: generic delimitation and chorology

The tribe Pavetteae sensu lato (Robbrecht 1994) consists of circa 20 genera and 1200 species (proposals to restrict the tribe were made after the initiation of the present project; Andreasen 1997). With the exception of the pantropical genus *Ixora*, the tribe is paleotropical. The island Madagascar is one of its centres of diversity (seven genera and circa 100 species). Three genera are endemic, while the endemism at specific level is as high as 95%.

The Malagasy Pavetteae are badly known; more than 50% of the species are new to science. Even worse, with the exception of *Ixora*, the genera are not readily distinguished since no comprehensive generic treatment exists. Usually all genera, with the exception of *Ixora*, are considered under the name *Tarenna* sensu lato. Bridson (1979) proposed this as a preliminary solution until a monographic treatment of the tribe could be executed. The same author described informal infrageneric groups to accommodate the variation in morphological and anatomical characters clearly present within *Tarenna* sensu lato. Another (unpublished) proposal was made by Capuron (1973). He recognized two genera, notably *Tarenna* (seeds not ruminant) and *Enterospermum* (seeds ruminant) and further described infrageneric groups in both genera. The present authors believe that more groups deserve recognition at generic rank, notably: *Ixora* (32/400), *Tarenna* (10/180), *Enterospermum* (35/40), *Paracephalis* (6/7), *Homollea* (3/3) and *Homolletia* (4/4) (between brackets: estimated number of Malagasy species/total number of species worldwide).

At the moment, all Malagasy genera have been studied in the field and monographic treatments are under way. Furthermore, the morphological and anatomical characters of the genera are being documented: this will result in better generic descriptions and more clear-cut generic delimitations. Characters of special value are

e.g. pollen morphology, number and form of seeds, presence or absence of rumination in the endosperm, placentation type, etc.

The monographs will also include distribution maps, which will be discussed chorologically (e.g. richness, endemism of certain areas, ...).

References: Andreassen K. (1997) Phylogeny of the Ixoroideae. Unpublished thesis, University of Uppsala. – Bridson D.M. (1979) Studies in *Tarenna* sensu lato (Rubiaceae subfamily Cinchonoideae) for part 2 of 'Flora of tropical East Africa: Rubiaceae'. *Kew Bull.* 34: 377-401. – Capuron R. (1973) Révision des Rubiacées de Madagascar et des Comores. Unpublished manuscript: notes regroupées et mises en forme par J. Bosser, dactylographiées de F. Chauvet. Laboratoire de Phanérogamie, Paris. – Robbrecht E. (1994) Advances in Rubiaceae macrosystematics. Introduction. *Opera Bot. Belg.* 6: 7-18.

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[Poster - SYST2]

Seed morphology and anatomy support the reestablishment of *Enterospermum*

In the tribe Pavetteae (Rubiaceae) an exceptional variation is observed in:

- the placentation type and the number of ovules per placenta (massive placentas with one to numerous impressed ovules to small placenta with one to few pendulous ovules);
- the number of seeds per locule (unique seed to numerous seeds per locule);
- the shape and the size of the seeds (small angular or lentil-shaped to large hemispherical, ellipsoid or spherical seeds);
- the rumination of the endosperm (entire, shallowly or deeply ruminant endosperm);
- the arrangement of the exostestal cells (forming an adaxial excavation, rounded, narrowly or irregularly elongated and running out or not into a basal longitudinal groove).

In this study, *Tarenna* sensu lato (Bridson 1979) is reconsidered with regard to this variation. Three major patterns may be discerned and characterize:

- (1) African, Madagascan and part of the tropical Asian representatives of *Tarenna* (large hemispherical or angular seeds possessing a shallow rounded adaxial excavation and an entire endosperm);
- (2) the tropical Asian type of the genus *Tarenna* (*T. asiatica*) and its close relatives (small angular seeds possessing a rounded adaxial excavation and a shallowly ruminant endosperm);
- (3) the African and Madagascan species formerly placed in *Enterospermum* (large spherical to ellipsoid seeds possessing an irregular adaxial excavation and a deeply ruminant endosperm).

The evidence of anatomical and morphological differences within the genus *Tarenna* sensu lato supports the reestablishment of the genus *Enterospermum*. Revisions for continental African *Tarenna* (ca. 50 spp.), Madagascan *Tarenna* (ca. 10 spp.) as for *Enterospermum* in Africa (ca. 10 spp.) and Madagascar (ca. 30 spp.) are being undertaken.

Infra-generic variation in morphology and anatomy is underlined for African *Enterospermum* species (1 to 7 pendulous or impressed ovules per placenta, endosperm shallowly or deeply ruminant, variation in the shape of adaxial excavation) and an evolutionary interpretation of this variability is proposed.

Reference: Bridson D.M. (1979) Studies in *Tarenna* sensu lato (Rubiaceae subfam. Cinchonoideae) for part 2 of "Flora of Tropical East Africa: Rubiaceae". *Kew Bull.* 34: 377-402.

C. DECOCK¹ & A. J. MASUKA²

[Lecture - MACRO1]

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Perenniporia centro-africana sp. nov. and *Perenniporia gomezii* (basidiomycetes, Aphyllophorales) first record from Central Africa

During a revision of the genus *Perenniporia* (CD), two specimens from Cameroon were studied and for which no name could be found. Therefore, a new species, *P. centro-africana* C. Decock et Masuka is proposed. The species is described, illustrated and compared with other morphologically related taxon from Africa (*P. tephropora*). *Perenniporia gomezii* originally described from South America is recorded for the first time in central Africa. The species is described and illustrated.

C. DECOCK¹ & A. J. MASUKA²

[Lecture - MACRO1]

¹ Mycothèque de l'Université catholique de Louvain (BCCM/MUCL), Louvain-la-Neuve, Belgique² Bioservices, Kutsaga Research Station, Harare, Zimbabwe***Perenniporia mundula* and its taxonomic synonym *Vanderbylia unguolata*: distinction, ecology, and distribution**

The type specimens of *Perenniporia mundula* and of its presumed taxonomic synonym, *Vanderbylia unguolata*, were revised. In addition, several original collections identified as *P. mundula* were critically reexamined. The presumed synonymy is rejected based on morphological and molecular evidences, and *V. unguolata* is accepted as a good species. The taxonomic placement of both taxa is discussed. *Perenniporia mundula* belongs to the *Perenniporia medulla-panis* group, whereas *Vanderbylia unguolata* belongs to a different alliance of species, and is related to *Perenniporia vicina*. The two latter taxa are compared. The distribution of *V. unguolata* is outlined. This species seems endemic to Southern Africa where it occurs mostly in the "Miombo ecosystem", preferably on leguminous trees.

Jérôme DEGREEF, Petra DE BLOCK & Elmar ROBBRECHT

[Poster - SYST1]

National Botanic Garden of Belgium, Meise, Belgium

A survey of African *Enterospermum*

In her study of the genus *Tarenna* from East Africa, Bridson (1979) stated that little reason exists for the generic separation of *Zygom* and the African species of *Enterospermum* from species already included in *Tarenna* and suggested to sink these two genera into *Tarenna* sensu lato. The author proposed a classification of *Tarenna* sensu lato in six informal infrageneric groups largely based on the placentation and seed types and hypothesized that relationships between these groups are established by species with intermediate characteristics. Bridson argued that this classification seems to be the most practical way of dealing with the taxonomic difficulties within these genera pending a monographic study of *Tarenna* sensu lato since that moment as the discontinuities between some groups were not well defined for the recognition of separate genera. Nevertheless, she mentioned that in Africa, the combination of reticulate seed surface and ruminant endosperm is strictly restricted to species with solitary spherical seeds.

A revision of *Tarenna* sensu Bridson is in progress on the basis of herbarium samples from Madagascar and continental Africa. First results confirm that the combination of the above mentioned characters characterize specimens belonging to the genus *Enterospermum*. The distribution of *Enterospermum* is limited to East and Southern Africa, the Mascarenes and Madagascar, the latter obviously being the centre of diversity for the genus. In Madagascar a wide variation in morphological characters (i.e. stipule shapes) is observed within the genus and subgenera and sections can be established. Variability is much more reduced in continental African species of *Enterospermum* but the reestablishment of the genus with regard to *Tarenna* sensu stricto is supported by morphological and anatomical seed characters (De Block et al., in preparation) as by differences in pollen morphology (De Block & Robbrecht, 1998).

Preliminary results are presented for continental African *Enterospermum*. We propose to transfer to *Enterospermum* all representatives of Bridson's infrageneric groups III (*T. zygoon*, *T. peteri*), IV (*T. graveolens*, *T. albicans*, *T. infundata*, *T. neurophylla*, *T. supra-axillaris*, *T. warransii*, *T. zimbabwensis*) and V (*T. nigricans*) while species from groups I and II will stay in *Tarenna* sensu stricto and the unique species of group VI (*T. tribracteata*) will be linked to *Paracaphalis*. A key to continental African *Enterospermum* is given and a distribution map of the genus is presented.

References : Bridson D.M. (1979) Studies in *Tarenna* sensu lato (Rubiaceae subfam. Cinchonoideae) for part 2 of "Flora of Tropical East Africa: Rubiaceae". *Kew Bull.* 34: 377-402. – De Block P. & Robbrecht E. (1998) Pollen morphology of the Pavetteae (Rubiaceae, Ixoroideae) and its taxonomic significance. *Grana* 37: 260-275. – De Block P., Degreef J. & Robbrecht E. (in preparation) Seed morphology and anatomy support the reestablishment of *Enterospermum*.

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[Lecture - MACRO1]

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Etude préliminaire des macromycètes associés aux forêts claires du Nord Bénin (Afrique de l'Ouest)

Des relevés myco- et phytosociologiques ont été effectués dans la forêt classée de Wari Maro (Atacora, Bénin). Les relevés ont été pris dans 18 placeaux installés dans six types de formations végétales différentes, c.-à-d. savane arborée, savane boisée, forêt claire à *Uapaca*, forêt claire à *Isoberlinia*, forêt dense à *Anogeissus* et forêt riveraine. La présence ainsi que la biomasse des macromycètes a été mesurée en continu durant toute la saison mycologique de 1999. Une analyse de similarité (cluster), utilisant les données présence-absence de chaque espèce au sein de chaque placeau, ainsi qu'une analyse de correspondance principale, utilisant les biomasses de chaque espèce, démontre qu'il existe trois groupements mycologiques dans les six formations étudiées. Une entité regroupe les champignons des forêts denses à *Anogeissus* et ceux de la forêt riveraine. La mycoflore y est caractérisée par la quasi absence d'ectomycorrhiziens et l'abondance d'espèces saprotrophes appartenant aux genres *Marasmius*, *Collybia* et *Pluteus*. La deuxième entité regroupe les espèces des savanes arborées (arborescentes) qui sont dans la plupart des cas du type ectomycorrhiziens. *Amanita masasiensis*, *A. subviscosa*, *Xerocomus luteovelutipes* n.pr. et *Lactarius baliophaeus* sont plutôt fréquents dans ce type de milieu relativement ouvert. La dernière entité est celle qui reprend les champignons des forêts claires du type savane boisée et forêt claire à *Isoberlinia* et/ou *Uapaca*. Les différences concernant les champignons entre ces formations sont très vagues. La présence de champignons ectomycorrhiziens y est nette, mais bon nombre de saprotrophes de la forêt riveraine et dense y sont représentés. Par rapport aux ectomycorrhiziens de la savane arborée on constate l'apparition de *Lactarius flammans*, *L. luteopus*, *L. edulis*, *Amanita beninensis* n.pr. (sect. *Phalloideae*), *Phylloporus tubipedes* et *Pulveroboletus* aff. *lignicole*.

Une liste des espèces comestibles, leurs formations végétales, ainsi qu'une estimation de la production (biomasse) relative, sont présentées. Une discussion concernant les relations entre la végétation, les actions de l'homme et la mycoflore est donnée.

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[Lecture - MACRO1]

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Connaissances ethnomycologiques endogènes du Bénin (Afrique de l'Ouest)

Cette contribution a pour but d'illustrer l'importance des connaissances endogènes en Afrique et est un plaidoyer pour la récolte de données ethnomycologiques en Afrique. Dans ce cadre les premiers résultats de plus de six mois d'études (ethno) mycologiques, de 1997 à 1999, au Bénin sont présentés. Un bref aperçu de la méthodologie concernant la collecte de données ethnomycologiques est présenté. Une liste de plus de cinquante macromycètes a été établie. Elle présente les champignons sauvages du Bénin, qui sont couramment consommés par les populations locales et dont nous avons pu tracer l'identité et la comestibilité dans la littérature scientifique. La liste contient un pourcentage important d'espèces dont la comestibilité n'était pas connue jusqu'à présent. Quelques cas particuliers, comme *Chlorophyllum molybdites*, sont discutés. La liste présente aussi les noms vernaculaires dans plusieurs importantes langues locales ainsi que leurs significations. Une discussion concernant l'origine des noms vernaculaires est donnée.

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[Poster SYST1]

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² National Botanic Garden of Belgium, Meise, Belgium

Revision of *Spermacoce* (Rubiaceae) in Katanga

The *Spermacoce-Borreria* group (Rubiaceae, Spermacoceae) forms a large complex with a worldwide distribution in the tropics and subtropics. According to various authors, the number of species varies between 150 and 266.

Generic delimitation is a matter of dispute in Spermacoceae. *Spermacoce*, conceived in a wide sense by some authors, is divided by other ones on the basis of peculiarities of the fruit dehiscence. As for the latter

case *Borreria* is characterised by capsules dehiscing from the apex downward with a vanishing septum and *Spermacoce* sensu stricto by fruits with two cocci, one dehiscent and the other indehiscent. These fruit characters are easy to observe, but no other features seem to corroborate the distinction between the two genera.

Recently, *Borreria* was merged with *Spermacoce* for the African representatives; researchers working on the neotropics, however, maintain the two genera distinct. A thorough revision is needed on a world basis in order to find the exact relations between these genera and to propose a subgeneric classification.

The present study of the *Spermacoce-Borreria* complex in Katanga (Congo-Kinshasa) forms a pilot study for such a worldwide revision. Katanga is an interesting starting point, since it is a centre of diversity for the complex, and both species from East and West Africa penetrate the region.

The importance of seed and pollen features for the defining of species is illustrated. Seeds are oblong ellipsoid or slightly ovoid with a ventral groove. An arillus is sometimes present, of which shape, colour and dimensions vary strongly between species. Pollen is large and pluricolpate: size, shape, number of apertures and exine features are supporting characters for species delimitation.

J.-B. Matchu-Mandje DHETCHUVI

[Poster - PHYTO1]

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Distribution patterns of African Marantaceae

The African flora of Marantaceae consists of eleven genera and 42 infrageneric taxa. This work deals with distribution of Marantaceae in Africa according to ecological affinities and distribution areas of these eleven genera and 42 infrageneric taxa. Ecological affinities show that Marantaceae are plants mainly from secondary forests, rain forests and gallery forests. Most species occur under 1000 m of altitude and also large number of species are found in wet regions with annual rain over 1500 mm.

Different patterns are defined using geographical distribution of African taxa. In this way the "isochore" gives 35 taxa in western Gabon and Cameroon and from there the number of taxa decreases to eastern region of African rainforest "Isoflora" for five genera (*Haumania*, *Hypselodelphys*, *Marantochloa*, *Megaphrynium*, *Sporophrynium*) with more than three species minimum shows the same pattern as "isochores".

According to geographical areas of infrageneric taxa, distribution patterns are mainly included in African rainforest area. Several disjunction and endemism patterns are also outlined.

The distribution patterns of Marantaceae suit also to the Gabon and Cameroon glacial rainforest refuges described by Maley (1994) and Siset (1994) and others, but they have some specificities.

M. A. DINIZ & E. S. MARTINS

[Poster - FLOR2]

Centro de Botânica, IICT, Lisboa, Portugal

The Botanical Centre of the IICT and the co-operation with African countries, former Portuguese colonies

The Botanical Centre of the IICT has a herbarium with about 240,000 specimens, most of them collected from former Portuguese colonies in Africa. It develops activities in areas such as taxonomy, phytogeography and ethnobotany. It is studying the *Flora of Cape Verde*, the *Flora of Mozambique* and the *Conspectus Florae Angolensis*, in collaboration with organizations in those countries. Studies are being undertaken on the flora, vegetation and ethnobotany in Guinea-Bissau, in co-operation with the government and private entities. In collaboration with the Royal Botanic Gardens, Kew, the *Flora Zambesiaca* is being studied. The Institute trains technicians from Portuguese speaking African countries, contributing to the development of the botanic studies in those countries.

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[Poster - MACRO1]

Microfungi from the rhizosphere of dominant plants of Wady Shagra, Red Sea Coast (Egypt)

Microfungi of the Rhizosphere of *Halocnemum strobilecium*; *Arthrocnemum macrostachum* (Zone I and II) *Zygophyllum coccineum*, *Zilla spinosa* and *Tamarix nilotica* (Zone III) comprising three zones of Wady Shagara were investigated. Thirty species of mitosporic (26 spp), zygosporic (3 spp.) and ascosporic (1 sp.) were isolated on Czapek-Dox medium (in sea water) with sucrose replaced by glucose, xylan, cellulose, starch and tannin. They are commonly xerotolerant. Higher counts were detected by glucophilic xylanophilic and cellulophilic species, lower count by tanninophilic species. The total number of species has been increased gradually landside from zone I to zone III accompanied with an overall increase of their total counts and improved of soil conditions. *Aspergillus carneus*, *Cladosporium cladosporioides*, *A. sulphureus* and *Scopulariopsis brevicaulis* were the common species. Particular fungal species were characteristic to particular plants with some common species. The biodiversity of species has been influenced to certain degrees by edaphic condition.

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[Lecture - FLOR1]

The Madagascar itineraries of the Rev. Richard Baron (1847-1907)

The Madagascar itineraries of the Rev. Richard Baron are reconstructed from information contained in his publications, unpublished letters, and other contemporary sources. Baron, who went to Madagascar in 1872 under the auspices of the London Missionary Society, began collecting plants in 1879 and over the course of the next twenty years sent 7000 numbered collections of plants to Kew, the British Museum, and Paris. The labels on his specimens are frustratingly simple ("Madagascar", "Central Madagascar", "Northern Madagascar", "Chiefly from north-western Madagascar") and would not be problematic except for the fact that a significant proportion of his collections serve as types. In addition, most fascicles of the "Flore de Madagascar et des Comores", as well as revisions and monographs of Malagasy taxa, cite Baron collections. Baron made his first and ultimately the majority of his collections on the Central Plateau in areas near Fianarantsoa and Antananarivo where he was stationed. Other collections were from the eastern forest along the route between the port of Tamatave and Antananarivo, a route Baron traveled many times as he entered or left the island on furlough. An important collection of almost 1000 numbers was made in 1886 on a three and a half month trip to Mandritsara and the northwest coast of the island. A few years later, in 1891, Baron spent five months touring remote congregations in the northern and northwestern parts of the island and made additional collections. Finally, in 1902 he participated in a two-month long geological and mining survey of the west and northwest portions of the island. The few plant specimens he gathered on this trip were initially sent to Paris but then forwarded to Kew for identification. By combining the scanty information on Baron's specimen labels and knowledge of his itineraries one can narrow down the region of Madagascar from which any given Baron plant collection came.

Marc DUBOIS

Systématique et phytogéographie des *Bauhinia* s.l. d'Afrique et de Madagascar
Résumé non reçu.

[Poster - SYST1]

Chris DUVALL

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[Poster - AREAS2]

Conservation status of the endemic tree *Gilletiodendron glandulosum* (Fabaceae-Caesalpinoideae) in Southwestern Mali

An ecological and ethnobotanical assessment of the status of the vulnerable endemic tree *Gilletiodendron glandulosum* (Port.) J. Léonard was carried out in Mali's Bafing valley in 1999. Using point-quarter, line intercept, and quadrat sampling, the plant community was analyzed for physiognomy and floristic diversity.

Additionally, Maninka names and uses of characteristic plants was recorded.

One hundred twenty-three species were collected, mostly Sudano-Guinean distribution types, including eighteen new records for Mali. The vegetation is overwhelmingly dominated by *G. glandulosum*, although *Grewia bicolor* Juss. (Tiliaceae) and *Hippocratea indica* Willd. (Celastraceae) are also important. Although this vegetation has been considered a type of Sudanian or Sudano-Guinean dry forest, it is more similar physiognomically and floristically to Sudano-Guinean gallery forest types. Several characteristic plants are rare, and their Maninka names are reported for the first time. Use of characteristic plants by the Maninka people is low, although the medicinal bush *Vepris heterophylla* (Engl.) R.Let. (Rutaceae) may be unsustainably harvested. The results support the theory that *G. glandulosum* gallery forest is a relict plant community, and show that the tree is not presently threatened with extinction by proximate causes. Recommendations for conservation measures are included.

Alain EMPAIN

[FLOR4]

National Botanical Garden of Belgium, Meise, Belgium

Seven years of Linux experience at BR, or How to do more with less

At BR, we used GNU/Linux from experimental projects to the first official federal web server running on APACHE/Linux. This approach gave us the opportunity to develop cheap and effective solutions taking into account the scarcity of credits (and of technical staff ...). We progressed from the server side (databases, http, ftp, mail...), to the client side (developer's workstations, end-user PCs). The server robustness is well illustrated by our web server which was restarted for the first time after 500 days of flawless duty.

Next, we generalized Linux workstations for the library staff (486's used as X-Window stations), using central database servers and graphical application servers when the wanted application cannot run on the local machine. Two years later, the stability and the intrinsic power of the tested solution enabled us to start the new phase: now every new PC is installed as a dual boot machine, allowing to boot Win98 or Linux, at will.

The various projects will be discussed mainly in the perspective of other institution's needs: everywhere, PCs of the 486-P120 classes are discarded because the modern versions of MS-Windows are too power hungry: they are yet fine to run Linux, easy to maintain—even remotely, and are now very cheap. Moreover, any current entry-level PC represents a powerful workstation or a very respectable server when running Linux.

Alain EMPAIN

[FLOR4]

National Botanical Garden of Belgium, Meise, Belgium

Informal tutorials about the use of Linux

Depending on the demand, various tutorials (French and English) will be organized about the practical aspects of the Linux usage.

If possible some laboratories will be organized: the tutorials must cover the full conference period to allow every participant to organize his/her schedule.

It is imperative to lower the attendance size at any given moment for a more informal and efficient contact. The subjects are only provided for information and will be adapted to fit the demand.

- 1- Hardware handling
- 2- Linux preconfiguration (disk partitions...)
- 3- Linux standard installation
- 4- Automation of the installations
- 5- Basic administration
- 6- Simple shell programming
- 7- X-Window and remote application servers (word processors, GIS, image handlers...)
- 8- networking basics
- 9- integration with MS hosts and products
- 9- firewalling

10- building a low-cost but efficient network, based on low-end PCs and one high-end application server (very important and rewarding project !)

Francisca ENEME Efua

Curef, Bata Litoral, Republica de Guinea Ecuatorial

[Poster - PHYTO1]

Analyse phytogéographique de la florule des environs de la réserve de Ndote (Guinée Equatoriale)

Généralités sur la Réserve de Ndote :

La Réserve de Ndote est située dans la Province littorale entre les coordonnées géographiques 1°25' - 1°30' N / 9°25' - 9°40' E. Elle fait partie de l'une des 13 aires protégées de Guinée Equatoriale.

Sa superficie est estimée à environ 33.000 ha, comprenant 24.000 ha d'habitats terrestres et 9.000 ha d'habitats marins.

Le climat est de type équatorial, chaud et humide. En raison de la proximité de la mer, les variations de température sont moindres qu'à l'intérieur du pays. Les précipitations sont plus abondantes dans la réserve de Ndote qu'à Bata avec des valeurs comprises entre 2500 et 4000 mm/an.

Position phytogéographique : La Région Continentale fait entièrement partie du Centre régional d'endémisme Guinéo-Congolais tel que défini par White (1983, 86); cette unité géographique supérieure est elle-même divisée en trois unités inférieures (White 1979), le Sous-Centre régional d'endémisme guinéen supérieur du Sénégal au Ghana, le Sous-Centre régional d'endémisme guinéen inférieur (bas-guinéen) et le Sous-Centre régional d'endémisme congolais. La Région Continentale fait tout entier partie du sous-centre d'endémisme bas-guinéen.

Le sous-centre régional d'endémisme bas-guinéen est lui-même subdivisé en trois Domaines, le Domaine des îles du Golfe de Guinée, le Domaine Bas-Guinéen atlantique (= Domaine nigéro-camerouno-gabonais de Letouzey 1968) et le Domaine Bas-Guinéen continental (= Domaine camerouno-congolais de Letouzey 1968).

La Région Continentale fait tout entier partie du domaine Bas-Guinéen atlantique (cf. la continuité avec les limites proposées pour la carte phytogéographique du Cameroun (Letouzey 1968))

Le domaine Bas-Guinéen atlantique appelé Domaine nigéro-camerouno-gabonais par Letouzey (1968) s'étend du Sud Nigéria au Mayombe congolais; au Rio Muni, le Domaine bas-Guinéen atlantique peut être subdivisé en trois territoires phytogéographiques à disposition Nord-Sud ayant ± valeur de secteurs :

- Secteur de plaines littorales et un territoire côtier de plaines comprenant les embouchures du rio Campo, du Rio Wolo et un territoire côtier de plaines sableuses littorales d'une trentaine de km de large reliant ces trois fleuves;

- Secteur des cordillères;

- Secteur des pénélaines de 500 à 700 m d'altitude dans la partie orientale de la Région Continentale.

Du point de vue floristique le secteur atlantique est caractérisé par un grand nombre d'espèces à distribution strictement littorale qui répondent généralement à des facteurs écologiques en relation directe avec le milieu marin, notamment des espèces psammo-halophiles (sur sable salé), des espèces des vases salées et des espèces des sables littoraux non salés.

Une caractérisation phytosociologique des espèces inventoriées est donnée.

Régine FABRI

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[Poster - FLOR1]

Paul Deuse (1921-1971), botaniste belge méconnu

Si la carrière scientifique de Paul Deuse a débuté en Belgique dans les Hautes-Fagnes à l'après-guerre, c'est en Afrique centrale, où il a travaillé de 1954 jusqu'à son décès en 1971, qu'elle a connu son plus grand développement.

Homme de terrain, phytosociologue, écologiste et palynologiste de formation, enseignant, nanti aussi d'une solide expérience de gestion d'une station de

Paul Deuse (1921-1971), unknown Belgian botanist

The scientific career of Paul Deuse started in Belgium in the "Hautes-Fagnes" during the post-war period, but came to its full expansion in Central Africa, where he worked from 1954 until his death in 1971.

Field worker, phytosociologist, trained as an ecologist and a palynologist, teacher, and endowed with a solid experience of how to manage a field

terrain, il quitta la Belgique en 1953 pour un premier périple de 3 mois au Congo, avec un mandat colonial de l'Université de Liège, sous le patronage de l'Institut pour la Recherche Scientifique en Afrique Centrale (I.R.S.A.C.). En mars 1954, il part comme chercheur temporaire au centre de l'équateur de l'I.R.S.A.C. à Mabali, où il accomplit un terme de 26 mois, jusqu'en mai 1956. C'est l'occasion pour lui de préparer une thèse de doctorat sur la végétation des «esobes» tourbeux du lac Tumba.

Suite à la défense de sa thèse à l'Université de Liège, début 1957, il est nommé chercheur senior à l'I.R.S.A.C. et envoyé au Rwanda à Astrida, dont il devient chef de centre en juin 1960. A la rentrée académique 1961-1962, il obtient une charge de cours part-time à la Faculté des Sciences de l'Université officielle du Rwanda-Burundi (Centre universitaire de Rumuri à Usumbura).

A son retour de Belgique début 1963, il reprend ad interim la direction du centre I.R.S.A.C. d'Astrida, rebaptisé Butare, d'abord en tant qu'employé par la Coopération au Développement (Ministère des Affaires étrangères et du Commerce extérieur, Belgique), puis, fin 1963, avec le statut de chef de travaux au Musée royal de l'Afrique centrale à Tervuren. A la même époque, il est nommé professeur ordinaire à l'Université nationale du Rwanda et un an plus tard Doyen de la Faculté des Sciences de cette Université. Suite à la signature de la convention belgo-rwandaise en 1964, il est désigné, en avril 1965, comme directeur de l'Institut National pour la Recherche Scientifique (I.N.R.S.) à Butare.

Ainsi qu'en témoigne la liste de ses publications, Paul Deuse a consacré l'essentiel de son activité scientifique à l'étude des tourbières du Rwanda et du Burundi. Toutefois, à partir de 1964, le temps qu'il a pu consacrer à la recherche scientifique a été fort réduit, compte tenu de ses fonctions de directeur de l'I.N.R.S. et de ses charges d'enseignement universitaire.

Les spécimens d'herbiers récoltés par Paul Deuse ont été déposés à l'herbarium de Mabali (1954-1956), puis de Butare (HNR) (1957-1971). Malheureusement ses carnets de récoltes et ses notes de terrain n'ont pas été conservés.

station, Paul Deuse left Belgium in 1953 for a first three-month tour of Congo with a colonial mandate from the "Université de Liège", under the auspices of the "Institut pour la Recherche Scientifique en Afrique Centrale (IRSAC)". In March 1954, he went to Mabali, where he worked for 26 months as a temporary researcher for the "IRSAC" until May 1956. During his stay in Mabali he prepared a doctoral thesis on the vegetation of the moorish "esobes" of the lake Tumba.

After submitting his thesis at the "Université de Liège" early in 1957, he was appointed senior research worker at the "IRSAC" and sent to Astrida in Rwanda, where he became head of the "IRSAC" centre in June 1960. At the start of the academic year 1961-1962 he became part-time assistant lecturer at the "Faculté des Sciences" of the "Université officielle du Rwanda-Burundi (Centre universitaire de Rumuri à Usumbura)".

Upon his return from Belgium at the beginning of 1963, he resumed ad interim the function of head of the Astrida (renamed Butare) "IRSAC" centre, first employed by the Development Cooperation (Ministry of Foreign Affairs and Foreign Trade, Belgium), then, towards the end of 1963, assigned senior scientific officer ("chef de travaux") to the "Musée royal de l'Afrique Centrale, Tervuren". During that same period he was appointed senior lecturer at the "Université nationale du Rwanda". A year later, he became dean of the "Faculté des Sciences" of that same university. Following the signing of the Belgo-Rwandan convention in 1964, he became director of the "Institut National pour la Recherche Scientifique (INRS)" in Butare in April 1965.

As his list of publications shows, Paul Deuse centered the main part of his scientific activity around the study of the peats of Rwanda and Burundi. From 1964 onwards, however, he cut down on his scientific research and assumed his responsibilities as a director of the "INRS" and as a university professor.

The herbarium specimens gathered by Paul Deuse were preserved at the Mabali Herbarium (1954-1956), then at the Butare Herbarium (HNR) (1957-1971). Unfortunately, his collection journals and field notes have not survived.

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[Lecture - SYST1]

Towards a monograph of African *Commelina* (Commelinaceae): a multifaceted approach

Commelina is the largest genus of Commelinaceae worldwide and in Africa, where an estimated 125 species occur. Species of *Commelina* are especially difficult to identify from herbarium specimens because of the poor preservation of the flowers (a character shared with all Commelinaceae); the great morphological similarity of many species; the frequent absence of diagnostic mature seeds; and insufficient collections of rarer taxa. Although the most widespread species often have extensive synonymies, there are many species yet to be described and likely many others awaiting recognition in the herbarium and in the field. A variety of approaches is being used to work towards a monograph of African *Commelina*. Studies of species for regional floras, especially for *Flora of Tropical East Africa* and *Flora Zambesiaca*, are looking at the variation in a species throughout its range, not just within the local region. In order to better define the subdivisions of the genus and species relationships a morphological data matrix is being developed for later cladistic analysis. Basic chromosome numbers of $x = 11-15$ have been found, but so far only one species group can be characterized by the synapomorphic basic number $x = 14$. Leaf anatomy has yielded some useful data, such as the constant presence or absence of hook-hairs in certain species groups and the occurrence of a palisade layer under both epidermises only in one group of orange-flowered species. Preliminary studies of spathe anatomy have suggested that taxonomically useful characters will be found, but sampling has been too sparse to draw any conclusions. DNA studies are planned in order to help define species groups, to determine relationships among the species, and to determine the phylogenetic significance of morphological and anatomical characters within the genus.

Ib FRIIS

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[Lecture - FLOR1]

Progress with the botanical exploration of Ethiopia and Eritrea during the last 40 years

In 1961 G. Cufodontis presented a review of the botanical exploration of northeastern tropical Africa. That paper almost entirely recorded European efforts.

Since then, the National Herbarium of Ethiopia in Addis Ababa (founded in 1958), and the beginning of the Ethiopian Flora Project in 1980 has marked the entrance of Ethiopian and Eritrean scientists on the scene. The current paper reviews the exploration made during the last 40 years, chiefly in connection with the Ethiopian Flora Project. There has been good correlation between collecting activity and the naming of new taxa.

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[Lecture - PHYTO2]

Etude des gradients latitudinaux de la végétation de sous-bois des plantations de teck (*Tectona grandis*) au Bénin

Un inventaire phytosociologique a été fait selon la méthode de Braun-Blanquet In Gounot (1969) dans le sous-bois des plantations de teck (*Tectona grandis* L.f.) du sud et du centre Bénin, entre les latitudes 06°26' et 08°40' nord et les longitudes 02°02' et 02°36' est. Afin d'étudier les gradients du spectre phytogéographique dans cette zone, les 108 relevés phytosociologiques que nous avons faits ont été soumis à l'analyse factorielle des correspondances. La variable de classification utilisée est le nombre d'espèces de chaque type phytogéographique. Les résultats d'analyse factorielle des correspondances

Study of latitudinal gradients of the understorey vegetation of teak (*Tectona grandis*) in Benin

Using the Braun-Blanquet approach, a phytosociological assessment has been done in the natural undergrowth of teak (*Tectona grandis* L.f.) plantations in south and central Benin (06°26' - 08°40' of north latitude and 02°02' - 02°36' of east longitude).

In order to study the phytogeographical spectra the 108 relevés assessed were submitted to factorial analysis of correspondence. The classification variable used is the number of species per phytogeographical type. The results help to identify three phytogeographical groups:

ont permis d'identifier trois groupes phytogéographiques :

- le premier groupe (I) est situé dans le sud-Bénin entre les latitudes 06°26' et 06°55' nord ; il est dominé par les espèces guinéo-congolaises (53%) ;
- le deuxième groupe (II) occupe principalement le centre-sud Bénin, entre les latitudes 07°1' et 07°10' nord. Il comporte une part non négligeable d'espèces guinéo-congolaises (36%) et d'espèces plurirégionales africaines (29%) ;
- le troisième groupe (III) occupe le centre-nord Bénin entre les latitudes 07°30' et 08°40' nord ; il est composé de 50% d'espèces de liaison (afrotropicales et soudano-zambéziennes) et de 30% d'espèces plurirégionales africaines.

L'analyse de la variance des types phytogéographiques des trois groupes ainsi identifiés a permis de mettre en évidence des gradients significatifs dont le plus remarquable est celui des espèces guinéo-congolaises : le nombre moyen (17) par relevé des espèces guinéo-congolaises du groupe (I) est significativement supérieur au seuil de probabilité de 5% à ceux des deux autres groupes (10 et 1) et la baisse de la richesse en éléments guinéo-congolais se fait progressivement du sud au centre-nord Bénin ; la richesse spécifique montre également un gradient significatif entre les trois groupes identifiés ; le groupe (I) a en moyenne 32 espèces par relevé contre 27 pour le groupe (II) et seulement 10 pour le groupe (III) ; ces richesses spécifiques sont significativement différentes les unes des autres au seuil de probabilité de 5%.

- group (I) is identified in south Benin (06°26' - 06°55' of north latitude),

- group (II) is located in center-north Benin (07°30' - 08°40' of north latitude), and

- group (III) holds an intermediate position between the first two groups (07°01' - 07°10' of north latitude).

The analysis of variance of the phytogeographical types, highlights significant gradients at 5% level of probability. The most relevant gradient is that of the guineo-congolian species: 17 as mean number of guineo-congolian species in the group (I) and respectively 1 and 10 for groups (II) and (III). Therefore, the richness of guineo-congolian species decreases progressively from south to central-north Benin.

The species richness shows also a significant gradient at 5% level of probability. The number of species is 32 in the group (I) (southern part of the study area), 28 in the group (III) and only 10 in the group (II) (northern part of the study area).

André GASTON¹ & Philippe DAGET²

[Lecture -AREAS2]

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La base FLOTROP et l'inventaire de la flore des pâturages d'Afrique sahélienne

La base FLOTROP initiée par le CNRS et le CIRAD est destinée à rassembler les observations sur la flore et la végétation des pâturages d'Afrique tropicale septentrionale, c'est à dire de la zone saharo-sahélienne à la zone soudanienne. Lors de consultations, elle permet des sorties élaborées, cartographiques ou en relation avec des modèles interprétatifs. Au 30 septembre 1999, la base porte sur 15 000 relevés repartis sur 60 ans, entre les latitudes 4 et 25 N, du Cap-Vert à la Somalie et provenant de plus de 100 observateurs : les auteurs présentent une analyse complète du taux d'échantillonnage correspondant et de sa variation spatiale.

G. DELEPIERRE, J.-P. LEBEL & D. GEERINCK

[Poster - SYST4]

Etat de la prospection des Orchidaceae au Rwanda

Avant l'indépendance de ce pays d'Afrique centrale en 1962, la famille des Orchidaceae n'avait jamais fait l'objet d'une recherche systématique. Quelques botanistes, travaillant dans un cadre plus général, ont

constitué des herbiers contenant également les orchidées les plus représentatives. Le nombre de taxons connus à la fin de cette époque était d'environ 80.

La période suivante, entre l'indépendance et le début des hostilités en 1992, fut marquée par une disparition importante du couvert végétal naturel mais aussi par une amélioration substantielle de nos connaissances des végétaux. Pour faire face à l'accroissement exponentiel de la population, le pays a organisé l'occupation systématique des savanes arbustives. Des paysannats furent créés en plusieurs endroits qui inévitablement ont remplacé la végétation naturelle et donc aussi les orchidées, par des cultures. En haute altitude, la forêt ombrophile de montagne a subi un sort identique.

Cette réduction drastique de la zone importante pour les orchidées s'est combinée heureusement par une recherche plus approfondie de nouveautés. L'agronome P. De Wankel qui supervisait l'établissement d'espaces à thé dans la région de la crête Congo-Nil, constitua la première collection vivante d'orchidées locales. D'autre part, G. Troupin et son équipe prospectèrent systématiquement plusieurs zones écologiques du pays dans le cadre de la préparation de la *Flore du Rwanda* et découvrirent de nouvelles espèces: le volume IV de cet ouvrage contient dès lors 165 taxons. Le couronnement de cette période est la publication en deux volumes (1984 et 1992) de la famille des Orchidaceae dans la série *Flore d'Afrique centrale* par D. Geerinck, avec 175 taxons décrits.

Actuellement, c'est à dire depuis la tragique guerre civile de 1994, les paramètres continuent à évoluer. Les 28 000 hectares de La forêt de Gishwati partiellement explorée sont déjà fortement secondarisés et son réservoir potentiel d'orchidées est en cours de disparition. Dans l'est du pays, l'ancien domaine de chasse du Mutatra (64 000 ha) est totalement occupé par l'élevage et les cultures. Le parc national de l'Akagera s'est réduit de 250 000 à 100 000 hectares. Par contre, Le parc national des Volcans reste quasi intact ainsi que la forêt de Nyungwe avec ses 97 000 hectares.

Depuis l'inventaire de 1992, quelques orchidophiles amateurs et éclairés ont continué occasionnellement des recherches (J. Babilon, D. Defleur) . J. -P. Lebal et G. Delepierre entretiennent une collection vivante à Kigali et continuent à explorer l'importante forêt de Nyungwe; ils ont ajouté 27 taxons pour le Rwanda et cinq nouveautés pour la science. Au total, on reconnaît actuellement 203 taxons parmi lesquels 131 sont épiphytes et 72 sont terrestres, répartis en 35 genres. La forêt de Nyungwe avec celle voisine au Burundi, constituant le plus grand bloc de forêt de haute altitude en Afrique centrale et possédant probablement le plus haut taux de biodiversité, contribue pour plus de deux tiers de l'inventaire des orchidées, avec 135 taxons appartenant à 29 genres et 130 espèces. Cette diversité ne doit pas surprendre quand on sait que les vallées, les versants abrupts et les hauts sommets se succèdent entre 1650 et 2950 mètres d'altitude. Combiné à une pluviosité qui s'échelonne entre 1000 et 2500 millimètres par an, cette variabilité de conditions écologiques conduit à une multitude de biotopes dont beaucoup sont encore inexplorés.

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[Poster - PLANT1]

Variation in the gene pool and active chemical compounds of *Ocotea bullata*: implications for commercialisation and domestication for bark-based medicine

Bark harvested from trees is commonly used in traditional medicine. With increasing urbanisation of rural people, the traditional use has turned into an extensive, informal commercial trade. Resource degradation and almost loss of some species stimulated a study to develop ecologically, socially and economically viable and sustainable business based on bark for medicinal use. *Ocotea bullata* (Lauraceae) is one of the Afromontane forest species from which bark is commonly harvested for medicine. The species has a very fragmented distribution in South Africa, with wide separation over relatively long geological time periods between the isolated occurrences. One focus for medium-term solution of the problem of resource degradation is to cultivate the tree to produce alternative, more productive sources of material. This would reduce the pressure on the forest resources. Variation in the gene pool and the composition and concentrations of the active chemical compounds in the widely separated populations may have conservation implications for the sourcing of material for the cultivation of tree crops. Similarities in the composition of the active compounds between

the bark and the leaves of a tree may offer the opportunity to develop alternative production systems. The results and implications from a current study will be presented.

R.E. GEREAU, A. HIPKISS & A. KAHEMELA

[Poster - PHYTO1]

Floristics and phytogeography of Lulanda Forest, Southern Tanzania

Lulanda Forest lies at the extreme southwestern terminus of the Udzungwa Escarpment in southern Tanzania (Iringa Region, Mufindi District), and as such represents the southernmost forest of the Eastern Arc Mountains. The extremely narrow (probably nowhere more than 20 km wide) Afromontane rain forests of the escarpment are watered by the last of the Indian Ocean monsoon rains after they cross the comparatively dry lowlands of the Selous Game Reserve. The forests have been severely fragmented by clearing for forestry and agriculture, and the present Lulanda Forest consists of three small forest patches. Despite its small size, however, the forest presents a rich flora of some 500 species including at least two endemics: *Keetia lulandensis* Bridson (Rubiaceae) and *Zimmermanniopsis uzungwaensis* Radcl.-Sm. (Euphorbiaceae). Of great phytogeographic interest are widely disjunct species such as *Grewia mildbraedii* Burret (Tiliaceae; disjunct from Uganda and Rwanda) and *Cola uloloma* Brenan (Sterculiaceae; otherwise known only from northeastern Tanzania and central Malawi). The authors present a checklist and phytogeographic analysis of the vascular plant flora of Lulanda Forest.

G. GERMISHUIZEN

[Poster - FLOR3]

National Botanical Institute, Pretoria, South Africa

Publications of the National Botanical Institute, South Africa

The National Botanical Institute (NBI) publishes the following journals and books: (1) *Bothalia*, a journal of international standard and status devoted to the furtherance of botanical science and covering mainly taxonomy, ecology, anatomy, cytology and botanical exploration; (2) *Flora of southern Africa*, a taxonomic treatise of the flora of South Africa, Lesotho, Swaziland, Namibia and Botswana, containing descriptions of families, genera, species, infraspecific taxa, keys to genera and species, synonyms, literature and limited specimen citations, as well as taxonomic and ecological notes; (3) *Flowering Plants of Africa*, a prestige series presenting colour plates of African plants with accompanying text and distribution maps; (4) *Strelitzia*, a series of occasional publications dealing with contributions too long for ordinary journals such as monographs, taxonomic revisions on African plants, botanical diversity, local floras, red data lists and ecological studies. Recent issues of these publications are featured, showing the cover and examples of some typical pages. Contributing authors are mainly NBI staff but articles by authors from all over the world currently researching African plants are accepted. The current editorial team consists of a scientific editor, two technical editors, a typesetter, a botanical artist and a computer typist. They are assisted by referees, local and from overseas. This presentation is an invitation to authors to submit suitable contributions on the African flora to one of these journals.

G. GOSLINE

[Poster - FLOR4]

The Herbarium, Royal Botanic Gardens, Kew, U.K.

New floras from old-conversion of existing floras into interactive electronic documents

New technology now allows the conversion of tropical Africa's existing floras into interactive electronic documents. This paper examines the methodologies involved in making the conversion together with the costs, the difficulties, the advantages and disadvantages, using the *Flora of West Tropical Africa* (Tropical Africa's only completed regional flora), as an example for a pilot study. Overviews are given of: desirable features of electronic floras and keys; state of the art in scanning and character recognition; potential capabilities of computer interpretation of free-form botanical descriptions and standardization of characters and states. Preliminary conclusions are that the computer-assisted interpretation of existing floras can give a considerable

jump-start to production of electronic keys and floras that are friendly to the non-specialist. The greatest immediate impact can be achieved by making existing hard-to-obtain floras widely available.

David J. GOYDER

[Poster - SYST1]

The Herbarium, Royal Botanic Gardens, Kew, U.K.

Morphology, distribution and centres of diversity in *Gomphocarpus* (Apocynaceae: Asclepiadeae)

Revision of this important but taxonomically difficult genus of 30-35 spp. is nearing completion. The core group of 18-20 species consist of several complexes. Two satellite groups, one of 5 species, the other of 7-10 species, are probably best treated at subgeneric rank.

Taxa within the species complexes can be distinguished principally by coronal characters, demonstrated here for the notorious *G. fruticosus* complex, but some vegetative features correlate, or are suspected to be of value, but data are frequently lacking. Major groups differ in leaf shape and/or type of rootstock.

Gomphocarpus is absent from wet regions such as the Congo basin and low lying parts of West Africa but occurs over the majority of subsaharan Africa, extends into southern and western parts of the Arabian Peninsula, and as far north as Jordan and Egypt. Three species (*G. fruticosus*, *G. physocarpus* and *G. cancellatus*) are widely naturalised in similar habitats elsewhere in the world. The core group is most diverse in the moderately dry regions of NE and E Africa centred on Ethiopia, Kenya and northern Tanzania, but a secondary centre of diversity occurs in southern and south central Africa. Taxa of these complexes have fibrous rootstocks and shrubby growth forms. A few outlying species in this group have more adaptations to specialist habitats and their distributions follow different patterns. The practically leafless *G. filiformis* is adapted to the most extreme desert conditions and occurs in the dry Karoo regions of South Africa and the Namib Desert. The only species restricted to the winter rainfall area of the Cape (*G. cancellatus*) has a very different morphology to the rest of the group with broad fleshy leaves and more robust stems. *G. rivularis* occurs only in seasonally flooded water courses in the subtropical Transvaal and has the flexible stems and linear leaves also shown by *Kanahia* which grows in similar habitats in the tropical regions further north. Both taxa have seeds which will float, but the adaptations are not homologous.

The two satellite groups (*G. glaucophyllus* group and *G. longissimus* group) are adapted to fire-prone habitats and have annual stems arising from woody or tuberous root systems. The distributions of these groups shadow montane grasslands or savannah woodland habitats. The southern highlands of Tanzania together with the neighbouring regions of Zambia and the Katanga plateaus of SE Congo are the centres of diversity for both of these groups, although the *G. longissimus* group also occurs in the savannahs of W. Africa.

Olwen M. GRACE¹, Trevor J. EDWARDS¹, Sarah A. THOMAS²

[Poster - SYST4]

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Velamen in African species of the orchid *Eulophia*

The genus *Eulophia* R.Br. ex Lindl. is a complex group of terrestrial orchids, many of which occur in Africa and Madagascar. Taxonomic treatment of the genus has been neglected, due to its size (230 species) and diversity. The relationship of *Eulophia* with neighbouring genera, notably *Oecoclades* and *Graphorkis*, is poorly defined. Identification of a suite of characters relevant to inter- and infra-generic classification is called for. In this study, the velamen tissue was considered for its potential as a taxonomic character. The study was focussed on fifty-five representatives of *Eulophia*, *Graphorkis* and *Oecoclades* from Africa and Madagascar. Roots were sectioned and examined by Scanning Electron Microscopy (SEM). Quantitative micromorphological parameters included velamen diameter, cell diameter, number of cell layers, and cell porosity. Cell shape and thickening pattern were employed as qualitative factors. To determine whether velamen reflect habitat, species were arranged in three rudimentary habitat categories, and data compared within and between groups. Two major trends were observed: with increased water availability, there is an apparent increase in velamen cell diameter and number of cell strata. In contrast, diameter of the tissue, and porosity thereof, decrease with increased moisture expedience. These findings correlate to the functional

importance of the velamen in securing moisture and dissolved nutrients. To ascertain the taxonomic value of velamen morphology, habitat categories were compared to current groupings of *Eulophia*, *Graphorkis* and *Ococlades*. Velamen morphology was found to coincide with basic taxonomic arrangements. It was therefore concluded that the velamen is a useful vegetative character in the treatment of the *Eulophia*.

J. M. GRIMSHAW

[Lecture - AREAS3]

c/o K. Sahin, Zaden B.V., Alphen aan den Rijn, The Netherlands

What do we really know about the Afromontane archipelago?

Of interest to botanists for nearly 150 years, the vegetation of African mountains has often been studied, but remains poorly understood. A brief history of exploration and study is presented, while lacunae in our knowledge of the systematics, ecology and biogeography of Afromontane plants are exemplified from field studies on Mt. Kilimanjaro, Tanzania, and other mountains. Suggestions are made for clarifying the nomenclature used for defining vegetation types, including the proposal to treat the Ericaceous and Afroalpine Belts as a single entity under the term Altimontane vegetation. Suggestions are made for future studies, and a plea is made for the complete recording of all plant species found on individual mountains.

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[Poster - PLANT1]

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Le genre *Garcinia* au Cameroun, diversité et utilisation traditionnelle

Le genre *Garcinia* L. est largement distribué dans les régions tropicales. En Afrique, ce genre occupe une place de choix dans l'alimentation et la pharmacopée traditionnelle des populations locales. Au Cameroun il regroupe plusieurs espèces parmi lesquelles *G. kola*, *G. lucida*, *G. mannii*, *G. polyantha* et *G. afzelii* sont fréquemment et couramment exploités. Ce sont soit des grands arbres comme *G. kola*, soit surtout des arbustes, qu'on rencontre dans les forêts denses très humides et marécageuses. De ces plantes, divers organes sont récoltés et servent à de multiples usages. Les feuilles, l'écorce, les fruits et les graines sont cependant les organes les plus exploités. Cette diversité dans les organes et les utilisations s'explique sur plusieurs plans. Plusieurs espèces de *Garcinia* sont employées pour le même type d'usage, et inversement, une même espèce intervient dans plusieurs catégories d'utilisation. Sur un autre plan, plusieurs organes d'une plante et ou d'une espèce sont exploités, de même que l'utilisation d'un type d'organe peut englober plusieurs espèces bien distinctes de *Garcinia*. Enfin, pour un usage ou type d'utilisation donné, plusieurs organes d'une ou plusieurs espèces sont utilisés; et inversement, un type d'organe d'une ou plusieurs espèces sert à plusieurs usages bien distincts. Outre ces diverses et multiples formes d'utilisations traditionnelles, des tests effectués par de nombreux travaux sur quelques

The genus *Garcinia* in Cameroon, diversity and traditional utilization

Garcinia L. is a genus widespread in tropical regions. This genus is a highly valued one as food and medicines for local population in Africa. There are many *Garcinia* species in Cameroon; *Garcinia kola*, *G. lucida*, *G. mannii*, *G. polyantha* and *G. afzelii* are the most commonly and frequently used. These are trees and mainly shrubs in swamp and humid forests. Divers plant parts are extracted from these species and are used for multiple purposes. However, leaves, bark, fruits and seeds are the most exploited plant parts. This diversity in plant parts and uses can be explain by many facts. One type of uses can involve many *Garcinia* species, and in the other hand, one species can be used for many purposes or utilisation types. Many parts or organs can be exploited from the same plant or species, as the same, the use of a type of organ can be concerned by many different species. At last, many plant parts and/or species are used for one type of utilisation and in the other way, one part or organ can be used for many types of utilisation.

Apart from these traditional uses, experimental studies have tested some *Garcinia* species principles and properties and have found some pigment and derives, active as antibiotic, anticoagulant, cardiovascular, anti-acid, anti-spasmodic, anti-inflammatory, anti-hepatotoxic.

espèces de *Garcinia* ont permis d'isoler des dérivés et des pigments possédant des propriétés anticoagulante, cardiovasculaire, antibiotique, anti-inflammatoire, anti-acide, anti-spasmodique et anti-hépatotoxique.

L'importance socio-économique de ces *Garcinia* tient à leur valeur nutritive, médicinale, sociale et marchande. La valeur nutritionnelle est conférée par les fruits comestibles riches en protéines, en éléments minéraux, en vitamines et en acides, qui constituent parfois des éléments d'appoint nécessaires en période de soudure. La multiplicité des affections traitées par divers organes des espèces de *Garcinia* montre que ces plantes possèdent de nombreuses vertus médicinales. Par ailleurs, les graines de *G. kola*, croquées comme noix de cola et le vin de palme fermenté par l'écorce de *G. kola* et *G. lucida* sont offerts aux visiteurs et étrangers en guise d'accueil chaleureux ou pacifique. Leur usage permet de renforcer les liens d'amitié, de favoriser l'insertion sociale et constitue parfois un rituel d'ouverture de certains événements tels que mariage, conciliabule, négociation, célébration. Enfin, la commercialisation à l'échelle locale, urbaine et sous-régionale des graines, des écorces et des rameaux de *G. kola* et de *G. lucida* procure d'importants revenus pour les populations impliquées dans cette activité.

Alors que l'exploitation des fruits ou des graines est écologiquement peu agressive au niveau de la vitalité et de la santé des arbres, les informations recueillies montrent pour *G. lucida* et *G. kola* que l'extraction de l'écorce et des racines s'accompagne d'une destruction des arbres, avec un taux de mortalité en moyenne de 35 à 50%. La structure diamétrique de ces populations d'arbre est en outre caractérisée par une quasi absence des individus dans les grandes classes de dimension. Une telle exploitation sélective et qui élimine les plus grands arbres, qui sont probablement les plus productifs en fruits et en écorce, laisse présager à long terme, une diminution drastique de ces ressources. Cette menace est d'autant plus réelle que le contexte socio-économique dans lequel se fait cette exploitation est marqué par une démographie galopante, une pénurie d'emplois et de revenus, et une pression sans cesse accrue sur les ressources naturelles. D'autres informations à l'instar de l'accroissement annuel, de la phénologie, de la production en graines, de la germination et du recrutement sont nécessaires afin de déterminer l'impact de cette exploitation au niveau de la dynamique de population et de définir des

The socio-economic importance of these *Garcinia* plants is due to the proteins, mineral elements, acid and vitamins contained by edible fruits which are sometimes very helpfully during times of food scarcity. In another way, the various and numerous diseases treated by many plant parts and/or species show that these *Garcinia* plants are very important as medicinal species for the health of local population. Socially the use of *G. kola* seeds as cola nut and the palm wine made or fermented by *G. kola* and *G. lucida* bark is an important factor of friendship and social integration. Sometimes it is a necessity to share cola and / or palm wine before the opening of many ceremonies, celebrations and negotiation. In a strictly commercial view, the local, urban and sub-regional trade of *G. kola* and *G. lucida* seeds, bark and twigs provide substantial incomes to people involved in this activity.

Although the harvesting of fruits and seeds has negligible effects on tree health and vitality, preliminary field information shows that tree mortality due to the extraction of *G. lucida* and *G. kola* bark and roots is very high, an average between 35 - 50%. The size class distribution exhibits by the population of these species lacks of individuals in the largest size classes. This selective exploitation then elimination of the largest trees and probably the most productive could lead to resource depletion. This fact is also underlined by the actual socio-economic context of these resource exploitation characterised by a galloping human demography, scarcity of employment and incomes and a continue pressure on natural resources. Other information, such as annual growth rate, phenology, fruit production, germination and recruitment are required to determine the impact of the exploitation of these products on the population dynamic and to define sustainable exploitation and management systems for these resources.

systèmes d'exploitation et de gestion durable de ces ressources.

Muhashyi K. HABİYAREMYE
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[Lecture- AREAS3]

Synthèse phytogéographique au sein du Domaine Montagnard Est Africain

La distribution de 1310 espèces intégrées dans des alliances phytosociologiques décrites du Domaine Montagnard Est Africain a été examinée. Une forte individualité de l'élément-base Afromontagnard est confirmée tandis qu'un faible niveau d'endémisme local est remarqué. Par contre, cette synthèse met en évidence des alliances connues uniquement du système montagnard de l'Imatongs-Usambara (*Cassipourion malosanae*, *Juniperion procerae*, *Ocotion usambarensis*); d'où la proposition d'élever ce système au rang d'un Secteur phytogéographique.

H.E.K. HARTMANN

[Lecture - PHYTO1]

Institut für Allgemeine Botanik, Hamburg, Germany

Phytogeographical patterns in Aizoaceae in Southern Africa

Based on the examination of about 5000 names at species and genus rank in Aizoaceae and on about 13000 collections from habitat it is possible now to reach clear delimitations of 134 genera and about 1800 species, the remaining names being synonyms. Changes in genus circumscription, the establishment of new genera, a clearer understanding of the species boundaries, and an intensified survey of in undercollected areas have led to an improved knowledge of the distribution of taxa at all levels. In comparison to previous patterns based on genus counts (Hartmann 1991, 1994), alterations are discussed. In addition, patterns for the species for some larger genera are presented illustrating different strategies in composition and possible migratory routes and suggesting evolutionary pathways.

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[Poster - SYST1]

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Leonotis

This poster presents work in progress on a monograph of the genus *Leonotis* and includes maps, photographs and an introduction to four new taxa from East and Southern Tropical Africa.

Leonotis (Pers.) R.Br. is a striking member of the Lamiaceae with instantly recognisable flowering stems bearing dense verticils of predominantly orange-haired flowers. The South African *L. leonurus* (L.) R. Br. is the type of the genus and has been grown in European gardens since about 1663. Only one taxon, *L. nepetifolia* (L.) R.Br. var. *nepetifolia* has a pantropical distribution – and is a renowned annual weed. All other taxa are only known from Africa and, apart from *L. nepetifolia* var. *africana* (P.Beauv.) Morton are perennial. The polymorphic *L. ocyimifolia* (N.E. Burm.) M.Iwarsson var. *raucariana* (Visiani) M.Iwarsson is the most widely distributed taxon within Africa. *L. ocyimifolia* differs from all the other taxa in having only a single fringe of hairs within the corolla tube. Many taxa are used medicinally in a number of different ways throughout the continent, particularly for stomach ailments in tropical Africa, although they are even smoked in South Africa.

The urgency of completing the *Flora of Tropical East Africa* and *Flora Zambesiaca* exposed a gap in our knowledge of the genus in tropical Africa. In this region there has never been a major work on the genus. After field studies and when looking at herbarium specimens it became evident that there are new taxa as yet undescribed. The first new species is a 3-5 m high shrub with a constricted calyx throat from the Southern Highlands of Tanzania, N Malawi and NE Zambia. The next is a new variety of *L. decedenta* Ginke from the Southern Highlands of Tanzania, distinguished from the other varieties by having short haired leaves and orange hairs on the calyx. Another new species is from the Southern Highlands of Tanzania, E. Zambia and

N. Malawi (especially the Nyika Plateau). This taxon has clusters of small narrow leaves. The final new taxon is from the Mafinga Hills bordering Malawi and Zambia and has leaves shaped like that of *Myrothamnus*.

The forthcoming monograph brings together all the separate African floral treatments on *Leonotis* and attempts to clarify the increasingly complicated synonym and the distribution of all taxa.

A. HEMP

[Poster - AREAS3]

Dept. of Plant Physiology, University of Bayreuth, Bayreuth, Germany

Ecology of the upper montane and subalpine forests on Mt. Kilimanjaro

Phytosociological studies in the forests of Mt. Kilimanjaro using the method of Braun-Blanquet (1964) were carried out since 1996. On Mt. Kilimanjaro the upper forest line is produced by *Erica excelsa*, which covers large areas of the subalpine zone in pure stands. It is also a constituent of the montane forests contributing to a lesser degree to the forests of the lower montane and to a higher extent to the forests of the upper montane zone. In the central montane zone *Erica excelsa* is very rarely. The boundary between *Podocarpus latifolius*-dominated montane forests and *Erica excelsa*-dominated subalpine forests is very sharp and presumably a result of fire. In contrast to statements in the literature *Erica excelsa* regenerates mainly by resprouting. Whether the *Podocarpus* forest is replaced by an *Erica* forest is therefore a question of intensity and frequency of fire. It appears as a the strategy of the light-demanding and pyrophilic *Erica excelsa* to burn readily without being killed and to cope in this way with competitors. Thus the upper forest border on Mt. Kilimanjaro is more influenced by fire than by climatic parameters. The disastrous fires of the last four years transitorily pushed the upper forest line by approximately 300 m downhill and recovery may require several decades without fire.

Marcel HOUINATO ¹ & Brice SINSIN ²

[Lecture - AREAS2]

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Analyse phytogéographique de la région des Monts Kouffé au Bénin

La région des Monts Kouffé est située au centre du Bénin entre 1°40' et 2°30' N et 8°25' et 9°15' E. Elle regroupe les forêts classées de Wari Maro et des Monts Kouffé. Elle est située entièrement dans le Centre régional d'endémisme soudanien (CRE) (White 1983). Elle est composée de savanes, de forêts claires et quelques forêts denses sèches. L'objectif de la présente étude est de donner la position phytogéographique des Monts Kouffé par rapport au Bénin et en Afrique occidentale. Des inventaires floristiques ont été effectués dans la région de 1996 à 1998. Ils ont engendré la récolte de 954 herbiers correspondant à 523 espèces et l'exécution de 186 relevés phytosociologiques basés sur les principes de la phytosociologie sigmatiste.

Les espèces de l'élément base soudanien représentent 14 % du spectre brut de la florule totale de la région des Monts Kouffé et sont *Andropogon gayanus* subsp. *bisquamulatus*, *Hyparrhenia involucrata*, *Hyparrhenia smithiana*, *Ischaemum amethystinum*, *Ctenium elegans*, *Detarium microcarpum*, *Terminalia avicennioides*, *Maranthes polyandra*, *Pericopsis laxiflora*, *Lannea acida*,

Phytogeographical analysis of Kouffé mountains in Benin

The Kouffé mountains are located in central part of Benin between 1°40' and 2°30' N and 8°25' and 9°15' E. This study is dealing with the protected forest vegetation of Wari Maro and Kouffé mountains. This vegetation is entirely located into Sudanian regional centre of endemism (RCE) (White 1983). It is composed of savannah, woodland and a few dry forests. The aim of present study is to determine the phytogeographical position of Kouffé mountains within Benin and western Africa. Between 1996 and 1998, some floristic surveys have been carried out. They produced a harvest of 954 herbarium specimens that corresponding to 523 species and 186 vegetation samples according to Braun Blanquet method.

Species of the sudanian base element represent 14% of the total flora spectrum of Kouffé mountains. These are *Andropogon gayanus* subsp. *bisquamulatus*, *Hyparrhenia involucrata*, *Hyparrhenia smithiana*, *Ischaemum amethystinum*, *Ctenium elegans*, *Detarium microcarpum*, *Terminalia avicennioides*, *Maranthes polyandra*, *Pericopsis laxiflora*, *Lannea acida*, *Khaya*

Khaya senegalensis, *Encephalartos barteri* et *Monotes kerstingii*. Deux des trois genres endémiques du CRE soudanien ont été récoltés, il s'agit de *Vitellaria paradoxa* et *Pseudocedrela kotschyi*.

Les espèces répandues à la fois dans les CRE soudanien et zambésien constituent 15% du spectre brut. Les espèces caractéristiques sont *Isoberlinia doka*, *Andropogon tectorum*, *Elymandra androphila*, *Hyparrhenia subplumosa*, *Pandiaka heudelotii*, *Lophira lanceolata*, *Tephrosia elegans*, *Tephrosia bracteolata*, *Parinari curatellifolia*, *Siphonochilus aethiopicus* et *Cochlospermum planchonii*.

Les espèces les plus représentées dans l'élément guinéen (11% du spectre brut) sont *Uapaca togoensis*, *Manilkara obovata*, *Cola gigantea*, *Hypoestes cancellata*, *Maranthus glabra*, *Mucuna poggei*, *Anchomanes difformis*, *Albizia zygia*, *Ampelocissus bombycina*, *Parinari congensis*, *Amorphophallus dracontoides* et *Psychotria vogeliana*. Elles sont surtout présentes en forêt galerie et forêt dense sèche car c'est la zone la plus méridionale du CRE soudanien en contact sud avec la zone de transition guinéo-congolaise/soudanienne.

Les autres espèces à distribution continentale africaine présentes dans plusieurs CRE représentent 33% du spectre brut. On y trouve surtout des espèces Afro-tropicales limitées à la zone intertropicale africaine : *Pennisetum unisetum*, *Loudetiopsis ambiens*, *Pouteria alnifolia*, *Rourea coccinea*, *Vitex doniana*, *Crossopteryx febrifuga*, *Piliostigma thonningii*, *Monechma ciliatum* et *Pavetta crassipes*. Les espèces à large distribution ne constituent que 27% du spectre brut.

senegalensis, *Encephalartos barteri* and *Monotes kerstingii*. Two of the three endemic species from the Sudanian RCE have been collected : *Vitellaria paradoxa* and *Pseudocedrela kotschyi*.

The species spread in both Sudanian and Zambesian RCE represent 15% of the spectrum. The characteristic species are *Isoberlinia doka*, *Andropogon tectorum*, *Elymandra androphila*, *Hyparrhenia subplumosa*, *Pandiaka heudelotii*, *Lophira lanceolata*, *Tephrosia elegans*, *Tephrosia bracteolata*, *Parinari curatellifolia*, *Siphonochilus aethiopicus* and *Cochlospermum planchonii*.

The most common species in the Guineo-Congolian element (11% of the spectrum) are : *Uapaca togoensis*, *Manilkara obovata*, *Cola gigantea*, *Hypoestes cancellata*, *Maranthus glabra*, *Mucuna poggei*, *Anchomanes difformis*, *Albizia zygia*, *Ampelocissus bombycina*, *Parinari congensis*, *Amorphophallus dracontoides* and *Psychotria vogeliana*. They mostly belong to gallery forests and dry forests because the studied region is located in the southern most part of the Sudanian RCE close to the regional transition zone of Guinea-Congolia/Sudania.

The other species with an african continental distribution and widespread in several RCE represent 33% of the spectrum. They are mainly composed of Afro-tropical species restricted to the african intertropical zone : *Pennisetum unisetum*, *Loudetiopsis ambiens*, *Pouteria alnifolia*, *Rourea coccinea*, *Vitex doniana*, *Crossopteryx febrifuga*, *Piliostigma thonningii*, *Monechma ciliatum* and *Pavetta crassipes*. Wide distribution species only represent 27% of the spectrum.

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[Poster - PLANT1]

AFlores: A database on the plant use in tropical Africa

"A study on the traditional use of plants in Africa" has been promoted as the AFlores (an abbreviation for "African Flores") project since late 1980s by the researchers at Kyoto University, involving others who are interested in the ethnobotany of tropical Africa. The project aims to accumulate ethnobotanical information on plant use and nomenclature which has been collected mainly by Japanese field researchers working in Africa, and to provide an effective system of information retrieval.

While a considerable amount of data have already been collected in Africa concerning plant use and indigenous botanical knowledge, these had been kept and used only by the individual scholars who collected them, and few comparative studies have been undertaken. In the AFlores project, these data are assembled and arranged according to a common format, then compiled into a database. Loaded onto a computer system, the database is managed quite effectively and can provide a wide range of users with an on-line information

retrieval. AFlora is also expected to serve as a guideline for collecting similar data on useful plants in the future studies.

The AFlora database covers quite a wide range of utilization information. Not only the information on material use of the plants such as for food and medicine, but also that on non-material use for ritual and other spiritual purposes are included. Also stored is the information on the plant referred in oral traditions, songs and proverbs, indirect plant uses such as bee plants and fodder plants. The AFlora covers a whole range of man-plant relationships which are the product of careful observation and rich experience of the African people for thousands of years. It is thus a database of the cultural and intellectual heritage of African peoples.

The structure of the AFlora database, information (fields) included in each record, categorizations of uses and used parts are discussed. Some of the uses of the database for comparative studies are also demonstrated.

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[Poster - SYST1]

Fruit and seed morphology as taxonomic parameters for the identification of *Cassia* species (Fabaceae - Caesalpinioideae) in West Africa

The fruits and seeds of twenty-three species of *Cassia* L. presently found in West Africa are described. As a result of the species fruits persisting till the following season, all the species can be identified throughout the year using the fruit and seed characters. A comparative external morphology of the seeds is used for the infrageneric classification of the genus into subgenera and sections. A dichotomous key for the identification of the species using the fruit and seed morphology is presented. Diagrams of the fruits and seeds are also made to aid identification of the species.

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[Poster - AREAS1]

Le genre *Sabicea* (Rubiaceae) à São Tomé et Príncipe

Ce travail s'insère dans le cadre d'une étude générale des plantes endémiques de l'archipel de São Tomé et Príncipe et est soutenu par le programme « Conservation et utilisation rationnelle des Ecosystèmes Forestiers d'Afrique Centrale » (en sigle Ecofac). Jusqu'à présent seulement trois espèces de *Sabicea* Aublet ont été recensées à São Tomé et aucune à Príncipe. Il s'agit de : *Sabicea exellii* G.Taylor, *Sabicea ingrata* K. Schum. et *Sabicea insularis* (Wernh.) G.Taylor. Toutes trois sont endémiques ; *S. insularis* est aussi présente sur Annobón.

Selon les divisions subgénériques établies par Wernham en 1914, *Sabicea exellii* devrait être classée parmi la section *Sessiles* caractérisée par des inflorescences denses sessiles et axillaires ou par des fleurs solitaires ou subsolitaires. Elle était seulement connue du type (Exell 284) jusqu'à sa récolte récente en 1999 par l'auteur dans une localité différente. *Sabicea ingrata* et *S. insularis* appartiennent toutes deux à la section *Capitatae* caractérisée par des inflorescences pédonculées compactes. Les variations morphologiques de ces deux espèces sont

The genus *Sabicea* (Rubiaceae) in São Tomé and Príncipe

This work is part of a more general study of the endemic plants of São Tomé and Príncipe archipelago and is supported by the program "Conservation et utilisation rationnelle des Ecosystèmes Forestiers d'Afrique Centrale (Ecofac)". Until now only three species of *Sabicea* Aublet have been recorded in São Tomé and none in Príncipe; these are : *Sabicea exellii* G. Taylor, *Sabicea ingrata* K. Schum. and *Sabicea insularis* (Wernh.) G. Taylor. All are endemic; but *S. insularis* is also found in Annobón.

If we follow the subgeneric divisions proposed by Wernham in 1914, *Sabicea exellii* should be classified among the section *Sessiles* that is characterized by dense and sessile axillary inflorescences or by solitary or subsolitary flowers. The species was only known by its type (Exell 284) until it was recently collected in a separate locality in 1999 by the author himself. *Sabicea ingrata* and *Sabicea insularis* belong to the section *Capitatae* characterized by compact pedunculated inflorescences. The morphological variation of these species is considerable and seems to be correlated with their altitudinal range (from 0 to 2000 m).

importantes et semblent corrélées à des différences d'altitudes (de 0 à 2000 m).

Une espèce nouvelle est présentée, *Sabicea thomensis*, qui se rattache à la section *Capitatae*. Il est intéressant de noter que malgré la proximité (200 km) de ces îles du continent aucune espèce des 65 espèces de *Sabicea* du continent africain n'a été recueillie à São Tomé ou Príncipe. Le genre y est donc représenté par seulement 4 espèces endémiques. Les cartes de distribution ainsi qu'une clé de détermination pour ces 4 taxa seront présentées.

A new species is presented, *Sabicea thomensis*, which belongs to the section *Capitatae*. It is remarkable that, in spite of the proximity of the islands from the continent (± 200 km) none of the 65 species of *Sabicea* from the African continent has been collected in São Tomé or Príncipe, where the genus is thus represented only by four endemic species. Distribution maps and an identification will be presented.

R.J. JOHNS, J.J. CLARKSON, P.J. EDWARDS & S.J.M. THOMPSON

[Lecture - PHYTO1]

The Herbarium, Royal Botanic Gardens, Kew, U.K.

The genus *Asplenium* (Aspleniaceae) in tropical Africa: an overview of its taxonomy, biogeography and centres of diversity

The genus *Asplenium* is the largest fern genus in Africa. A data base of the collections of *Asplenium* has been made for all African material at Kew and Nairobi. Available collections total some 4200 numbers, of which 3802 collections were successfully localised. The database has been used to produce a series of maps showing the distribution of the tropical African species, and enables the identification of centres of diversity and patterns of endemism in tropical Africa. Pterisorematism has been studied for all species with collections selected from throughout their range in Africa and this has highlighted patterns of local speciation in complexes such as *Asplenium holstii*.

Collections of *Asplenium nudus* from East Africa, used for DNA studies, emphasise the relationship of the Eastern Arc Mountains to the flora of Madagascar and South East Asia. The probability of a considerable increase in species in the centres of diversity is emphasised particularly with reference to Mount Cameroon and the Eastern Arc Mountains.

Carel C.H. JONGKIND

[Poster - FLOR3]

ECOSYN Projekt, Nationaal Herbarium, Wageningse Vestiging, Wageningen University, Wageningen, The Netherlands

A new field guide for the West African (Upper Guinea) woody forest plants

A new field guide for the West African (Upper Guinea) woody forest plants is on its way to be published. It includes all woody plants of the Upper Guinea forest area (ca. 1700 species). To facilitate use in the field, the field guide focuses in the first place on the vegetative characteristics of the plants (leaves, bark, latex, etc.) and includes illustrations for all species. Descriptions of the flowers and fruits are given for most species as well and a cross-section of the stem is shown for a selection of the lianas.

The *Field Guide to the Forest Trees of Ghana* by William Hawthorne was the starting point for this work but the new guide will of course include many more species and habits (including shrubs and lianas) and will be useful in a much larger geographical area.

N. JURGENS

[Lecture - PHYTO2]

Botanical Institute, University of Cologne, Köln, Germany

Analysis of shifting desert margins by macrotransect monitoring

Abstract not received.

Emile KAMI
CERVE, Brazzaville, Congo

[Poster - PHYTO1]

Phytogéographie des Gramineae du Congo-Brazzaville

Une étude phytogéographique des Gramineae du Congo Brazzaville a été faite. Environ 3800 spécimens d'herbiers ont été examinés. Ces échantillons sont déposés dans les Herbaria suivants : IEC, BRLU, P, BR, et POZG.

La flore graminéenne du Congo comprend environ 220 espèces et taxons infraspécifiques. Sur un total de 6 sous-familles, 1 seule est absente au Congo. Il s'agit de la sous-famille des Pooideae répandue en régions tempérées et sur les sommets tropicaux dépassant les 1500 m ou 2000 m d'altitude.

Les territoires phytogéographiques les mieux prospectés et les plus riches en espèces sont les Cataractes, la Léfini et la Haute-Sangha. Certains ont été moins prospectés jusqu'à présent, tels que le Chaillu et la Basse-Sangha.

Trois genres à aire restreinte ont été recensés au Congo: le genre monospécifique *Chevalierella* (*C. dewildemanii*) récolté seulement dans les Cataractes, le genre *Microcalamus* (*M. barbinodis*) également récolté dans les Cataractes, enfin le genre *Guaduellia* recensé dans le Kobilou, le Mayombe et le Chaillu.

S. KATIVU
Department of Biological Sciences, University of Zimbabwe, Harare, Zimbabwe

[Poster - SYST3]

Isoenzyme infraspecific variation in *Eucomis autumnalis*

Abstract not received.

B. KHAYOTA, D. ODHIAMBO & B. BYTEBIER
East African Herbarium, National Museums of Kenya, Nairobi, Kenya

[Lecture - FLOR2]

The ex-situ national orchid collection of Kenya

The *ex situ* orchid collection of the East African Herbarium was started in 1995 as part of the activities of the Plant Conservation Programme.

The collection currently holds 750 plants belonging to 120 species, and thus is one of the largest collections in the region. Of the 120 species represented, a 100 have an epiphytic growth habit, while the remaining 20 are terrestrial. The majority of the material is of Kenyan origin. All plants are fully documented.

The collection is housed in three greenhouses at the Nursery of the developing Nairobi Botanic Garden of the National Museums of Kenya. One of these houses is open to the public and is visited by schoolchildren, local visitors and tourists alike.

The living collection complements the over 6000 dried orchid specimens already deposited at the East African Herbarium, and because it contains specimens of poorly known taxa is of great help for taxonomic studies. Apart from this the living collection is used for embryology studies, for harvesting seed for our seed bank, and for educating the public on conservation.

The collection is also a germplasm stock for possible re-introduction programmes.

Gerold KIER & Wilhelm BARTHOLOTT
Botanical Institute, University of Bonn, Bonn, Germany

[Poster - PHYTO2]

Measuring and mapping endemism of the African flora using a new methodology

Biodiversity maps are most often restricted to displaying species richness. There are, however, numerous other criteria of the quality of biodiversity. An important criterion of biodiversity value is endemism which can be calculated and mapped in an index which is not only a function of range sizes (Usher 1986, Williams 1993) but also of species richness.

This index, here referred to as "endemism richness", can be interpreted as the specific contribution of a region to global biodiversity. One of its advantages over species richness is its linear relation to area which makes the task of comparing regions of different size easier. Another advantage is the fact that the resulting

scores usually do not rise but rather drop when a region is invaded by alien species which then outcompete native species.

A new method for calculating endemism richness is presented. It is based on the division of the flora or fauna in chorological groups and thus requires less data than the conventional method. We present a map of African seed plant endemism richness based on this method. Minimum values of endemism richness can be observed in the Sahel and Sahara regions, whereas the highest value was calculated for the Cape region, followed by East Madagascar with an already considerably lower score.

References: Usher, M.B. (ed.) (1986) Wildlife conservation evaluation. Chapman & Hall, London. - Williams, P.H. (1993) Measuring more of biodiversity for choosing conservation areas, using taxonomic relatedness. In: Moon, T-Y (ed.) International symposium on biodiversity and conservation, pp. 194-227. Korea University, Seoul.

V. KIMPOUNI

[Poster - PLANT1]

S/C Projet Konkouati, Pointe-Noire Congo, Ecole Normale Supérieure, U.M.NG., Brazzaville Congo

Contribution aux études ethnobotaniques et floristiques de la forêt de Lossi (Congo) : les plantes de cueillette à usage alimentaire

L'enquête ethnobotanique, auprès des populations autochtones et riveraines de la forêt de Lossi (Cuvette-ouest), a permis d'inventorier quelques plantes utiles (cultivées et sauvages) dont elles se servent au quotidien. Cette étude couvrant le volet alimentaire a conduit à évaluer le potentiel alimentaire de cette forêt et l'impact de la cueillette, sur la conservation du patrimoine phylogénétique et son exploitation soutenue.

M. KOEKEMOER

[Lecture - SYST2]

National Herbarium, National Botanical Institute, Pretoria, South Africa

The *Metalasia* group (Gnaphalieae - Relbaniinae, Asteraceae)

A taxonomic revision of genera in the *Metalasia* group (*Amphiglossa* DC., *Atrichantha* Hilliard & Burt., *Bryomorpho* Harv., *Calotesta* Karst., *Disparago* Gaertn., *Dolicothrix* Hilliard & Burt., *Elytropappus* Cass., *Hydnalea* Karst., *Lachnospermum* Willd., *Phaenocoma* D.Don, *Pterothrix* DC. and *Stoebe* L.) was undertaken.

A thorough survey of morphological characters by scanning electron microscope and anatomical studies revealed several characters that were not previously considered in the taxonomy of the group.

The study resulted in the combination of *Amphiglossa* and *Pterothrix*, the division of *Elytropappus* into three genera, the resurrection of *Seriphium* as well as the description of six new species. In the process several new combinations were made and nomenclatural and taxonomic problems were addressed.

M. KOEKEMOER & L. FISH

[Poster - FLOR1]

National Herbarium, National Botanical Institute, Pretoria, South Africa

Exploration in southern Africa – analysis from herbarium records

The Pretoria National Herbarium holds 750 000 specimen entries for the 'Flora of southern African' region on the PRECTS database. These entries enable us to extract the number of species and specimens recorded for each quarter degree square in southern Africa.

From this data we can see that many areas are poorly known and for 17% of the grids no specimens are recorded. The largest number of these grids are in Namibia, Botswana and in the Cape provinces. Swaziland seems to be comparatively well known. The grid with the highest diversity (3318CD) is in the Fynbos Kingdom in the Western Cape and has 2 531 species and 9 814 specimens recorded to date.

Areas that are poorly known are targeted for intensive collecting efforts in an attempt to improve our knowledge of the biodiversity in the area, to extend distribution patterns and to find new plant records. This program has been running at the National Herbarium for more than twenty years and will continue indefinitely.

John O. KOKWARO

University of Nairobi, Nairobi, Kenya

[Poster - FLOR1]

The 19th and 20th centuries botanical exploration in East Africa

There are several reasons why a historical account of the botanical exploration of East Africa is essential. First, it is from these early collections that we cite the type (original) specimens. Second, most commemorative epithets are derived from the early collectors who first "discovered" a particular species by collecting the first type specimen. Indeed, there are many plants named after these early botanical explorers of our area.

Before we study the plants, we will begin by reviewing early plant exploration in East Africa. In our introductory remarks, we will be looking at the foundations of the *Flora of Tropical East Africa* (F.T.E.A.), which is the basic reference for our plant families. F.T.E.A. is a series of books dealing with plant groups (families) whose publication is still in continuation at Kew Herbarium in England. In September 1860 John H. Speke and J.A. Grant were in Zanzibar preparing to start, on 25 September 1860, the great journey that was to produce the first collection of dried plants from the interior of our area.

1860 thus marks the end of the Preliminary period of botanical exploration, when enquiry was confined to short visits to the coast of what was British East Africa, and the beginning of the second, or Heroic Period, when explorers and missionaries botanized sporadically, and at the risk of their lives, in the unsettled and still largely unknown interior. The third period, that of Colonial Establishment. After 1918 the number of collectors becomes too great for all to be features of botanical exploration since 1948.

B.O. OWUOR¹ & J.O. KOKWARO²

[Lecture - PLANT1]

¹ International Centre for Research in Agroforestry, Tree Domestication Programme, Nairobi, Kenya

² University of Nairobi, Nairobi, Kenya

Medicinal plants of Migori District in Kenya

Aspects of ethnobotany, ethnosystematics and ethnomedicine of the Luo, and agropastoral community of Migori district, Kenya are recorded based on a one year field and laboratory research. The study reveals a rich ethnobotanical knowledge and a fascination relationship between drug use and culture. Entries of 312 medicinal plants in 272 genera of 80 angiosperm families are made. 1781 remedy reports are ascribed to these plants. 76 % of these medicinal plants are reported more than once. 43% of the Migori pharmacopoeia is from 6 plant families with high species diversity, these are Compositae (14%), Leguminosae (12%), Euphorbiaceae (6%), Labiatae (4%), Solanaceae (3%) and Acanthaceae (3%). Aspects of Luo herbalism, medicinal trade and medicinal plant conservation have also been recorded. Some plant species appear threatened in the field due to overuse (a list of 21 vulnerable and 21 cultivated medicinal plants) is recorded. 28 broad categories of disease have been identified, the major disease conditions reported being associated with gastrointestinal complications. The roots, bark and leaves are the most used medicinal plant parts and fruits least used. Herbaceous plants are extensively used as materia medica and decoctions the most popular galemeal preparations. Though two medical systems co-exist in Migori, it appears traditional medicine is still favoured due to a number of socio-cultural and economic considerations.

A. KORTLANDT

Oxford, U.K.

[Poster - VAR1]

Wanted: an ecologist, botanist, forester, and/or biogeographer

Wanted, an ecologist, botanist, forester, and/or biogeographer willing to co-operate, as a co-author, in research on the habitat ecology of the pygmy chimpanzee (bonobo).

Research aims:

- 1) What is the botanical range of habitats to which the species is adapted, and why?
- 2) What is its ecological limit in the pristine forests in the southeast?

Approach:

1) Literature research. Largely done, but the report has still to be written. (Relevant material available in reprints and photocopies and elaborated in tables).

2) Field work postponed until better times.

Qualifications:

1) A good knowledge of French.

2) Experience of African tropical rain forests.

Reference: A. Kortlandt: A survey of the geographical range, habitats and conservation of the pygmy chimpanzee (*Pan paniscus*): an ecological perspective. *Primate Conservation*, 16.

Lazare A. KOUKA

[Poster - AREAS1]

Laboratoire de Botanique systématique et de Phytosociologie, Université Libre de Bruxelles, Belgique

Diversité des groupes phytogéographiques dans le Parc National d'Odzala (Congo-Brazzaville)

Le Parc National d'Odzala (PNO) possède une grande diversité des types de végétation: vers l'est et le sud, les savanes occupent les interfluvies et sont parsemées d'îlots forestiers; vers l'ouest et le nord, la couverture forestière est complète et les interfluvies y sont occupées par des forêts denses et des forêts clairsemées à Marantaceae.

Les données analysées proviennent des inventaires des transects mis en place dans les différents sites du PNO en vue de l'étude de la biodiversité. Il s'agit des transects suivants: à l'ouest le transect Mbandza long de 15 km; au sud le transect Andzoyi long de 5 km; au centre le transect Tombi long de 25 km; au nord-est les transects Ekagna et Ossassanga longs de 5 km chacun. Les inventaires ont concerné les ligneux à dbh > 10 cm (diameter at breast height) sur 5 ha à Mbandza, 2,5 ha à Andzoyi, 12,5 ha à Tombi et 5 ha à Ekagna et Ossassanga; et ceux à dbh > 70 cm sur des superficies dix fois plus grandes que les précédentes.

La répartition des 238 espèces inventoriées est étudiée à partir des informations géographiques indiquées dans les différentes flores et articles originaux de l'Afrique tropicale. Les statuts phytogéographiques ont été attribués aux espèces en accord avec les subdivisions chorologiques admises pour l'Afrique centrale (White 1986). Dans la chorologie du Congo (Kimpouni et al. 1992), le PNO se situe entièrement dans le District de la Haute-Sangha limité du côté est par la Basse-Sangha, en continuité avec le forestier central (District phytogéographique du Congo-Kinshasa d'après Robyns, 1948); par contre du côté ouest et nord, la flore du PNO est soumise aux influences des flores camerounaise et gabonaise (Descoings, 1975).

Les espèces inventoriées ont été rassemblées en quatre groupes phytogéographiques: les espèces guinéennes nettement prédominantes et représentant 81% de la florile, une espèce endémique du District de la Haute-Sangha (*Diospyros whitei*), les espèces

Diversity of phylogeographical groups in the Odzala National Park (Congo-Brazzaville)

The Odzala National Park (ONP) includes a high diversity of vegetation types: forest-savanna mosaic in the East and South; rain forest and scattered Marantaceae forest in the West and North. The basic data set results from two types of samples: 10 inventories of 2.5 ha each for trees with diameter at breast height (dbh) > 10 cm; 10 inventories of 25 ha for trees with dbh > 70 cm (at 1.30 m over the ground). The tree inventory was carried out according to the transect method in order to study the biodiversity in the ONP. The following transects were established: in the west the Mbandza transect, 15 km long; in the south the Andzoyi transect, 5 km long; in the centre the Tombi transect, 25 km long and in the north-east (Ekagna and Ossassanga transects), two transects of 5 km each.

The total taxonomic list consists of 238 species belonging to 47 families. The species geographical groups are discussed mainly with reference to the phylogeographical subdivisions of White (1986). The phylogeographical subdivision of Congo (Kimpouni et al., 1992) shows that the ONP is situated in the High-Sangha District, limited to the East by the Low-Sangha District, in contact with the Forestier central (phytogeographical District of Congo-Kinshasa according to Robyns 1948). In the West and North, the ONP is influenced by gabonese and camerounian floras (Descoings 1975).

The phylogeographical analysis of the concerned flora gives four phylogeographical groups: the predominant basic Guineo-Congolian element (81 % of the flora), one species (*Diospyros whitei*) endemic to the High-Sangha District, linking species (16 %) and species with very broad geographical area (2 %).

The ONP constitutes the western border for many camerounian and gabonese species (*Dacryodes buettneri*, *Pachypodanthium confine*,

de liaison (16 %) et les espèces à large répartition (afro-malgache et pantropicale, 2%).

Le Parc National d'Odzala constitue la limite orientale de nombreuses espèces des forêts camerounaise et gabonaise (*Dacryodes buettneri*, *Pachypodanthium confine*, *Polyceratocarpus pellegrinii*, *Scyphocephalum ochocoa*, ...), pour lesquelles les milieux marécageux de la Sangha constitueraient un obstacle. Il forme la limite occidentale de diverses espèces de la Cuvette congolaise (*Beilschmiedia congolana*, *Brenania rhomboideifolia*, *Entandrophragma palustre*, *Schefflerodendron gilbertianum*, ...) qui n'atteignent pas le bassin de Ogooué.

Polyceratocarpus pellegrinii, *Scyphocephalum ochocoa*, ...); and the eastern border for congoian species (*Beilschmiedia congolana*, *Brenania rhomboideifolia*, *Entandrophragma palustre*, *Schefflerodendron gilbertianum*, ...).

Muna KRINGS¹ & Trevor J. EDWARDS¹

[Poster - SYST1]

¹ School of Botany and Zoology, University of Natal Pietermaritzburg, Scottsville, South Africa

A re-examination of *Streptocarpus johannis* (Gesneriaceae)

Streptocarpus johannis is a South African species which occurs in southern KwaZulu-Natal and the northern parts of the Eastern Cape. Within the context of the genus *S. johannis* represents a chimera being rosulate like the *Streptocarpus rexii* alliance but having tightly constricted corolla throats which approximate those of the unifoliate *S. polyanthus* group.

This unusual combination of characters led Hilliard and Burtt (1971) to postulate a hybrid origin for *S. johannis*. This paper examines the plausibility of this suggestion and the homogeneity of *S. johannis* across its range. Comparisons are made of morphological and micromorphological characters across the geographical range of the species and these are compared with the putative parents of the species. From this analysis it appears highly unlikely that *S. johannis* is a hybrid species and the shift in floral form is probably the result of co-evolution with long tongued insects. In addition the current taxon needs to be subdivided into two separate species. The typical species is limited to the coastal forests around Pt. St. Johns (Eastern Cape) and a new species which occurs at high altitudes on the southern border of KwaZulu-Natal.

J.N. LABAT¹, Justin MOAT², David J. DU PUY³

[Lecture - AREAS4]

¹ Muséum National d'Histoire Naturelle, Laboratoire de Phanérogamie, Paris, France

² GIS Unit, The Herbarium, Royal Botanic Gardens, Kew, U.K.

³ The Gardens, Oxenfoord Castle, Edinburgh, U.K.

Diversité des espèces et aires protégées à Madagascar. Exemple des Papilionoideae

La richesse écologique et la forte diversité font de l'île de Madagascar un enjeu important pour la communauté internationale dans le domaine de la conservation. Le réseau actuel des aires protégées a été précédemment évalué par Du Puy et Moat en étudiant la distribution de la végétation naturelle à partir d'imagerie satellite pour mettre en évidence les types de végétation qui sont peu ou non protégés. L'imagerie satellite ne permet pas souvent une bonne représentation des formations végétales sèches et ne donne aucune information sur la composition floristique actuelle de la végétation. Nous voudrions montrer ici quelle protection l'actuel système des aires protégées offre au niveau spécifique et générique en utilisant les Leguminosae Papilionoideae.

Une révision récente de cette sous-famille par Du Puy et al. a permis une meilleure connaissance et compréhension des espèces et de leur distribution. L'ensemble des spécimens étudiés a été informatisé et géoreferencé au Laboratoire de Phanérogamie (P) dans la base de données SONNERAT. Les Papilionoideae constituent un excellent groupe pour ce type d'étude vu son importance par le nombre d'espèces (360 espèces natives dans 65 genres), le taux élevé d'endémisme, tant au niveau générique (17%) que spécifique (plus de 70%), leur importance écologique (espèces structurantes de la végétation en particulier dans les régions sèches) et leur valeur économique (bois de palissandre par exemple).

La base de données sur les spécimens de Papilionoideae, les cartes des aires protégées de Madagascar et les cartes de végétation ont été intégrées dans un système GIS (Geographic Information System) ce qui a permis d'identifier :

- les aires protégées présentant une forte diversité pour les Papilionoideae;
- les Papilionoideae endémiques des aires protégées;
- les aires protégées très peu collectées et étudiées;
- les zones à haute diversité spécifique de Papilionoideae qui sont peu ou pas protégées
- les zones en grand danger (avec de rares vestiges de végétation primaire et un haut niveau d'endémisme ou de diversité).

François MALAISSE ¹ & Béatrice LETEINTURIER ²

[Lecture -AREAS2]

¹ Jardin botanique national de Belgique, Meise, Belgique

² Laboratoire d'écologie, Gembloux, Belgique

Copper flora from South-Central Africa: survey, evolutionary and biosystematic aspects

About 540 taxa have been recorded from copper outcrops of Katanga (Democratic Republic of Congo), Zambia and Zimbabwe. This flora, distributed in 80 families, is particularly well represented in the high evolved orders, contrary to other metals flora (notably nickel one).

Nevertheless the suggested plant list is provisional. Indeed, not only several sites have never been prospected from a botanical point of view, but also a lot of specimens are still undetermined. Lastly, among the observed copper ecotypes, some are waiting for a revision and (or) for a description. This is notably the case of two systematic complexes which are presented and which are relevant to the genera *Cheilanthes* (Sinopteridaceae) and *Thunbergia* (Acanthaceae).

La flore du cuivre de l'Afrique centro-australe: aperçu, aspects évolutifs et biosystématiques

Quelque 540 taxons ont été recensés sur les sites cuprifères du Katanga (République Démocratique du Congo), de Zambie et du Zimbabwe. Cette flore, répartie en 80 familles, est particulièrement bien représentée au sein d'ordres très évolués, ce qui contraste avec la flore de sites riches en d'autres métaux lourds (notamment en nickel).

La liste de plantes proposée est toutefois provisoire. En effet, non seulement plusieurs sites n'ont encore jamais été prospectés d'un point de vue botanique, mais, de plus, un nombre non négligeable de récoltes restent à déterminer. Enfin, parmi les écotypes cupricoles observés, un certain nombre sont en attente de révision et (ou) de description. C'est notamment le cas de deux complexes systématiques qui sont présentés et qui se situent au sein des genres *Cheilanthes* (Sinopteridaceae) et *Thunbergia* (Acanthaceae).

François MALAISSE ¹ & Béatrice LETEINTURIER ²

[Lecture - FLOR1]

¹ Jardin botanique national de Belgique, Meise, Belgique

² Laboratoire d'écologie, Gembloux, Belgique

On the tracks of botanist collectors of copper outcrops of South-Central Africa

Several botanists were interested in the flora of copper outcrops from South Central Africa (Katanga, Zambia, Zimbabwe); some went fortuitously on these sites, others have devoted a lot of time to this flora, notably Duvigneaud, Wild and Malaisse.

Moreover, according to the excursions realised, some outcrops have been particularly well botanized contrary to others that are still almost or totally unknown from a botanical point of view.

Sur les traces des botanistes récolteurs sur les gisements cuprifères d'Afrique centro-australe

De nombreux botanistes se sont intéressés à la flore des gisements cuprifères d'Afrique centro-australe (Katanga, Zambie, Zimbabwe); certains se sont rendus fortuitement sur de tels sites, alors que d'autres y ont consacré beaucoup d'intérêt, notamment Duvigneaud, Wild et Malaisse.

De même, à la guise des excursions réalisées, certains gisements ont été particulièrement herborisés, tandis que d'autres sont restés pratiquement ou totalement méconnus des botanistes.

At last, if the original vegetation of some sites is still intact, mining activities carried out, in several sites, have induced a deep deterioration of it leading sometimes to its total destruction.

In addition of maps showing the ways taken by recorders and the intensity of botanical exploration of different outcrops, the specimens recorded are surveyed according to sites and collectors in a database which quotes moreover the intensity of anthropic alteration.

Enfin, si la végétation originelle de certains sites est restée intacte, l'activité minière a, dans de nombreux endroits, provoqué une altération profonde de celle-ci menant souvent à sa destruction totale.

En plus de représentations cartographiques laissant apparaître les itinéraires parcourus par les différents récolteurs et l'intensité de l'exploration botanique des différents gisements, l'ensemble des récoltes par sites et par récolteurs est représenté au sein d'une base de données qui signale encore l'intensité de l'altération anthropique.

François MALAISSE¹ & Béatrice LETEINTURIER²

¹Jardin botanique national de Belgique, Meise, Belgique

²Laboratoire d'écologie, Gembloux, Belgique

[Poster - PHYTO2]

Geomorpho-chimio-phytosociological transects: a tool to the understanding of copper outcrops vegetation of South-Central Africa

Several phytosociological studies dealing with copper outcrops vegetation of South Central Africa are using bidimensional representations including, apart data about copper sites' vegetation, informations on site geomorphology and soil chemistry.

Published transects are represented and some originals concerning other outcrops are presented. Finally, correlations between these different schematic representations are realised in order to produce a theoretical transect of these metalliferous clearings.

Transects géomorpho-chimio-phytosociologiques: un outil pour l'étude des gisements cuprifères de l'Afrique centro-australe

Bon nombre des études phytosociologiques réalisées relatives à la végétation des sites cuprifères d'Afrique centro-australe font appel à des représentations bidimensionnelles incorporant, outre des données relatives à la végétation, des informations sur la géomorphologie du site et sur la chimie du sol.

L'ensemble de ces transects publiés est figuré et, certains, inédits à ce jour, et se rapportant à d'autres gisements sont présentés. Enfin, des corrélations sont établies entre ces différentes représentations schématiques en vue d'obtenir un transect modèle théorique de ces anomalies métallifères.

Sigrid LIEDE

Dept. of Plant Systematics, University of Bayreuth, Germany

[Lecture - SYST3]

Phylogeny of the genus *Cynanchum* (Apocynaceae - Asclepiadoideae) in Africa

Even after the exclusion of *Vincetoxicum* (Liede 1996a), the genus *Cynanchum* is still the largest genus of the most advanced asclepiadaceous tribe, the Asclepiadeae, characterized by pendulous pollinia. It is also the only genus with a worldwide distribution, even though most of the American species have been shown to be of different affinity. For Africa (including Madagascar) about 100 species are known, and the revisions are complete for both mainland Africa (Liede 1996b) and Madagascar (Liede, in press). A cladistic analysis of the morphological matrix (Liede 1997) has led to the following hypotheses: (1) all African and Madagascan *Cynanchum* are monophyletic (2) *Pentarrhinum* constitutes a small, but independent sister genus, characterized by thick walled, mostly muricate follicles; (3) the Madagascan species are not monophyletic as a whole, but consist of several well-supported clades off different position between the mainland taxa; (4) the leafless species, including *C. gerrardii* and *C. lenewtonii* of the African mainland and the species hitherto attributed to the genera *Folotsia* and *Karimbolea* form a single, well-supported clade.

These hypotheses have been tested using the Internal Transcribed Spacer (ITS) region of nuclear ribosomal RNA genes of and the trnL-trnF spacer of the chloroplast genome (Taberlet 1981). Hypothesis (1) and (4) are strongly supported by the molecular data, while support for the other 2 hypothesis is weaker. A detailed analysis of the phylogeny of the African and Madagascan taxa will be presented. A special research project on the leafless taxa will be introduced.

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I.B. LIENGOLA

[Poster - PLANT1]

CEFRECOF/Epulu, Kampala, Uganda

Contribution à l'étude des plantes alimentaires spontanées chez les Turumbu et les Lokeles du District de la Tshopo, République Démocratique du Congo

Résumé non reçu.

I.B. LIENGOLA

[Poster - VAR1]

CEFRECOF/Epulu, Kampala, Uganda

Extension de l'aire de distribution de quelques espèces recensées dans les grands plateaux de la Réserve de faune à Okapis. Forêt de l'Ituri, République Démocratique du Congo

Résumé non reçu.

Porter P. LOWRY II

[Poster - AREAS4]

c/o Laboratoire de Phanérogamie, Muséum National d'Histoire Naturelle, Paris, FRANCE

Missouri Botanical Garden, St Louis, Missouri, USA

Chorology of *Polyscias* (Araliaceae)

Abstract not received.

C. LUBINI Ayingweu

[Lecture- AREAS1]

Laboratoire de Biologie, Institut Supérieur Pédagogique de la Gombe, Kinshasa, R.D. du Congo

Analyse phytogéographique de la flore des forêts climaciques du secteur Kasai au Congo Kinshasa

Les forêts climaciques du secteur phytogéographique Kasai au Congo Kinshasa sont de type ombrophile semi-semipervement mélangé, jouissant d'un climat subéquatorial et, le plus souvent développées sur les ferrisols forestiers issus des roches du Karoo.

Une analyse phytogéographique limitée à 672 espèces les plus caractéristiques et fréquemment observées dans les forêts climaciques du secteur montre que :

1. les espèces largement distribuées dans les divers centres régionaux d'endémisme floristique de l'Afrique intertropicale sont relativement peu nombreuses et ne représentent que 10 % du total spécifique ; en général elles sont écologiquement plastiques ;

2. le groupe d'espèces du Centre régional d'endémisme guinéo-congolais, notamment des sous-centres de la Vallée du Niger et du Bassin Congolais constituent le noyau spécifique très largement majoritaire, soit 84,3 % ; les espèces du Bassin forment un sous-groupe, avec 22,3 % du total ;

3. les espèces endémiques dans le secteur exprimant l'originalité floristique de cette entité chorologique ne représentent que 3,42 % ; amonçant ainsi une dilution de la richesse spécifique du secteur forestier central voisin ;

4. au niveau local, la flore de ces forêts a beaucoup d'affinités avec celle de la cuvette centrale congolaise dont elle est un prolongement. L'examen des aires de distribution semblables permet de distinguer plusieurs catégories dont les espèces distribuées dans l'ensemble du secteur, les espèces centrales, septentrionales, orientales, méridionales et occidentales ;

5. les espèces à aire restreinte semblent se confiner dans les synusies inférieures de ces forêts.

C. LUBINI Ayingweu

[Lecture - MACRO1]

Laboratoire de Biologie, Institut Supérieur Pédagogique de la Gombe, Kinshasa, R.D. du Congo

Impact des activités humaines sur les macromycètes de la région de Kikwit au Congo - Kinshasa

La dégradation continuelle des milieux naturels provoquant la réduction drastique des massifs forestiers et l'érosion des sols ont des conséquences directes sur la flore macromycète de la région de Kikwit au Congo-Kinshasa, se traduisant par la raréfaction de certains taxons. Les espèces des genres *Agaricus*, *Cantharellus*, *Lactarius*, *Macrolepiota*, *Marasmius*, *Russula* et *Termitomyces*, jadis courantes dans la région, se rarefont à la suite de la destruction de leurs sites naturels. Seules les espèces ubiquistes, notamment celles du genre *Auricularia*, se développant sur les bois morts sur pied ou au sol s'observent encore assez fréquemment dans la région. Ce phénomène a des répercussions sur l'alimentation des populations locales.

C. LUKHOBIA

[Lecture - FLOR2]

University of Nairobi, Department of Botany, Nairobi, Kenya

The missing link in Herbaria and botanic gardens development in Africa

Abstract not received.

K. A. LYE

[Lecture + Poster - FLOR3]

Department of Biology and Nature Conservation, Aas, Norway

Progress in the work on the Flora of Uganda

1. *Flora of Uganda*. First volume containing 550 species of grasses and sedges have been written and is now being edited. About 50 of 550 illustrations are not yet ready. Main author Sylvia Phillips of Kew. This flora differs from FTEA and other standard floras in that all species are being illustrated. Publication is scheduled for 2002.

2. *Tree flora of Uganda*. This is a modern version of Eggeling's *Indigenous Trees of the Uganda Protectorate*. Also all 600 species in this flora will be illustrated. Main author A. B. Katende from Uganda.

3. A series of popular floras is also being issued, the first one entitled *110 common Ugandan grasses* is written and is now being edited for publication in late 2000 or early 2001.

Work on these floras, including payment for artists, are being financed by Norwegian organizations.

B. A. MACKINDER

[Lecture - SYST3]

Royal Botanic Gardens, Kew, UK

Systematics of the genus *Berlinia* (Leguminosae – Caesalpinioideae): a preliminary study

The Leguminosae, comprising some 18,000 species is the third largest angiosperm family and is traditionally treated as three subfamilies. Subfamily Caesalpinioideae is the least studied, is principally tropical and comprises some 3000 species in 150 genera assigned to 4 tribes (Caesalpinieae, Cassieae, Cercideae, Detarieae *sensu lato*). The tropical African genus *Berlinia* Hook.f. consists of ca. 18 species of medium to large trees, is most species rich in the Guineo-Congolian region and is assigned to the tribe Detarieae *sensu lato*. *Berlinia* (as currently recognised) was delimited in 1957 based primarily on seedling characteristics. Some heterogeneity of floral form exists and is accommodated in two generic sections. Generic affinities within tribe Detarieae are little understood. A recent (as yet unpublished) study of generic relationships within the tribe, based on chloroplast DNA *trnL-F* sequence data indicate *Anthonothea*, *Gilbertiodendron*, *Pellegriniodendron* and *Librevillea* as close relatives though using conventional morphological characters, most authors have treated *Isobertinia* as sister group to *Berlinia*. In this study, a test of the monophyly of *Berlinia*, along with an investigation of its generic affinities have been undertaken utilising DNA sequence data from two sources, the plastid locus (*trnL-F* (UAA) 5' intron) and the nuclear locus (internal transcribed spacer region: ITS), in conjunction with morphological characters. Data from the latter two sources were combined in a simultaneous cladistic analysis. The results provide evidence for the monophyly of *Berlinia* as currently circumscribed, support *Isobertinia* as sister group to *Berlinia* and suggest *Isobertinia* may represent a recent radiation.

Jean MALEY

IRD & CNRS, Université de Montpellier-2, France

[Poster -AREAS1]

La destruction catastrophique des forêts d'Afrique centrale survenue il y a environ 2500 ans BP exerce encore une influence majeure sur la dynamique et la répartition actuelle des formations végétales

De nombreuses recherches ont clairement montré que les forêts tropicales se sont fragmentées et ont considérablement régressé durant le dernier Maximum Glaciaire qui a débuté il y a environ 20.000 ans. La dernière phase d'extension forestière maximum a débuté il y a environ 10.000 ans BP (avant l'Actuel) en même temps qu'est intervenue la dernière phase de réchauffement global. Jusqu'à très récemment de nombreux spécialistes estimaient que les forêts d'Afrique centrale n'avaient pas subi de perturbations majeures entre cette date et le début du 20^è siècle. Or cela est inexact car des recherches géologiques et palynologiques effectuées depuis une dizaine d'années sur des sédiments lacustres prélevés dans plusieurs sites de cette région ont clairement montré que vers 2500 ans BP les forêts d'Afrique centrale ont subi des destructions catastrophiques qui ont été associées à une phase de forte extension des savanes. Cette phase catastrophique a dû être très brève car dans les mêmes niveaux où a été observée une quasi disparition des arbres de type primaire, associée en même temps à une forte extension des formations savanicoles, il a été aussi noté pour certains sites comme au lac Barombi Mbo (Ouest Cameroun) et au lac Kitina dans le Mayombe (Congo occidental), une expansion rapide des végétations arborées pionnières, ce qui a dû correspondre à une première phase de cicatrisation qui a initié la reconstitution de la canopée. Pour d'autres sites comme au lac Ossa près d'Edea dans le sud Cameroun, la forte perturbation du milieu forestier préexistant n'a pas été associée à une extension régionale des savanes, mais elle s'est seulement marquée par une brutale extension des formations pionnières. Ces diverses données montrent que la phase de destruction forestière survenue vers 2500 ans BP a été un phénomène très bref mais très intense. De ce fait, les divers «refuges» qui ont pu subsister lors de cette phase n'ont pas été constitués de blocs forestiers d'une seule pièce mais d'une mosaïque de micro refuges formés par des collines isolées, des forêts galerie, des versants bien exposés, etc. Le caractère général du phénomène de destruction, son synchronisme apparent (à l'échelle des datations C14 qui s'échelonnent de 2800 à 2000 ans BP) entre les différents sites étudiés à travers l'Afrique centrale (sud Cameroun, Congo, Gabon) et son association avec une phase érosive généralisée permettent de conclure qu'il a résulté d'une vaste perturbation d'origine climatique et aussi que ce phénomène ne peut pas être imputé à l'Homme. Certains auteurs estiment même que ce sont les variations des paléoenvironnements qui, au cours du 3^e millénaire BP, pourraient avoir été une des causes principales de la migration des Bantous à travers l'Afrique centrale.

Vers 2000 ans BP, lorsque le climat est redevenu plus humide et régulier, la dynamique forestière a été dans l'ensemble très intense et a conduit à la reconstitution progressive du Domaine Forestier. Le retour des formations forestières de type primaire est intervenu à des époques différentes suivant la position géographique des sites. En effet la rapidité du recul et de la fragmentation du Domaine Forestier s'oppose à la lenteur, au retard, de sa reconstitution ultérieure car le front de recolonisation a mis parfois jusqu'à 2000 ans pour atteindre certains secteurs périphériques qui n'ont été recolonisés qu'au 20^è siècle. Une telle évolution en dent de scie peut être comparée à un phénomène d'hystérésis. Des recherches effectuées sur la végétation actuelle montrent qu'au cours du 20^è siècle le phénomène d'extension forestière se poursuit toujours d'une manière très intense, et ce malgré les feux de savane qui peuvent retarder le phénomène mais qui ne le bloquent pas.

L'aspect en mosaïque de certaines forêts actuelles, caractérisées par un mélange ou une juxtaposition de groupements d'espèces de type sempervirent et de type semi-caducifolié, comme pour les forêts «de type Congolais», est probablement une conséquence à long terme des perturbations qui ont affecté le Domaine Forestier depuis 3 millénaires avec d'abord une intense phase de destruction, suivie ensuite par une phase de reconstitution qui se poursuit encore à l'heure actuelle.

En conclusion, il apparaît donc que la fragmentation et la destruction des forêts tropicales peuvent être associées, au niveau global, soit à une phase Glaciaire, comme entre 20.000 et 10.000 ans BP, soit au contraire à un Interglaciaire, c'est à dire durant une phase Chaude, comme cela s'est produit vers 2500 ans BP. Lorsqu'on examine les Modèles Climatiques concernant le phénomène de «Réchauffement Global» que la plupart des climatologues estiment devoir intervenir au cours du 21^è siècle, il apparaît qu'un accroissement moyen de la température de 4 °C, conduirait aussi à un accroissement de l'évaporation d'environ 30% mais

avec seulement 12% de plus de pluie pour l'Afrique tropicale (d'après les estimations de Rind, 1995). C'est dans le cadre de tels modèles que la phase de destruction des forêts d'Afrique Centrale vers 2500 ans BP, survenue durant une phase climatique relativement chaude et liée probablement à un accroissement des pluies de type convectif, peut être un «Analogue» mais aussi un Signal d'Alarme de ce qui pourrait survenir en Afrique centrale au cours du futur «Réchauffement Global» (Maley 1997).

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Cecilia P. MALIWICHI

[Poster - PLANT1]

National Herbarium and Botanic Gardens, Zomba, Malawi

Medicinal plants used for maternal and child health in Malawi. A case study of Mulanje District
Abstract not received.

M. A. MANDANGO

[Poster - FLOR2]

Institut Pédagogique National, Département de Biologie, Kinshasa, Rép. Dém. du Congo

Herbarium National et Jardins botaniques en République Démocratique du Congo

Il n'existe pas d'Herbarium National en tant qu'Institution scientifique en République Démocratique du Congo.

C'était entre 1893 et 1897 que l'éminent naturaliste et botaniste belge Emile Laurent, Professeur à l'Institut Agronomique de l'Etat de Gembloux a exploré le Congo, alors colonie Belge. A son retour, il a persuadé le Gouvernement belge sur l'opportunité de créer des Jardins botaniques au Centre de l'Afrique en vue d'y développer la production agricole.

En effet, le début de l'année 1900 a vu la création du Jardin botanique d'Eala près de Mbandaka, dans la Province de l'Equateur et celui de Kisantu, à 120 km au Sud-Ouest de Kinshasa, dans la Province du Bas-Congo.

Les jardins botaniques d'Eala et de Kisantu ont également visé deux buts principaux. Sur le plan scientifique, il était question de conserver les espèces locales et introduites, augmenter la collection vivante afin de servir de base à la sélection et au remplacement d'autres espèces disparues, susciter l'intérêt des plantes médicinales et alimentaires par des recherches chimiques, étudier la flore africaine en général ainsi que celle de la Cuvette Centrale Congolaise et du Bas-Congo en particulier. Sur le plan économique on devait améliorer les cultures vivrières et industrielles par des essais expérimentaux et susciter l'intérêt touristique par la réserve forestière arboretum, musée, pépinière, vergers et potagers.

L'exploration botanique et l'étude de la flore congolaise ont permis de récolter des centaines de milliers de spécimens botaniques sous l'impulsion jadis du Comité de Direction de l'Institut National pour l'Etude Agronomique du Congo Belge, actuel Institut National pour l'Etude et la Recherche Agronomique, qui ne joue malheureusement plus le même rôle !

Les doubles d'herbiers venus des Jardins botaniques d'Eala et de Kisantu ainsi que de l'immense collection botanique régionale et générale de Yangambi ont considérablement contribué à l'étude de la flore locale et africaine.

Ainsi l'élaboration, au Jardin botanique national de Belgique à Meise, de 10 volumes de la Flore du Congo belge et du Ruanda-Urundi, de la Flore du Congo, du Rwanda et du Burundi, témoigne de l'apport hautement scientifique des Jardins botaniques congolais.

C'est avec un grand respect et une profonde émotion que nous pensons aux célèbres membres scientifiques et techniques disparus du Comité exécutif de la Flore d'Afrique Centrale en général et de la République Démocratique du Congo en particulier !

Enfin, faute de moyens financiers et techniques conséquents, les jeunes botanistes congolais ne peuvent poursuivre l'exploration botanique et réaliser des travaux floristiques similaires.

Isaac MAPAURE

[Poster -AREAS2]

Tropical Resource Ecology Programme, Department of Biological Sciences, University of Zimbabwe, Harare, Zimbabwe

Small-scale variations in species composition of miombo woodland in Sengwa, Zimbabwe: the influence of edaphic factors, fire and large mammal herbivory

Miombo woodland in Sengwa exhibits clear small-scale patterning and variations in species composition. Even though the dominant tree species of *Julbernardia globiflora*, *Brachystegia boehmii* and *Brachystegia spiciformis* remain relatively the same in most of the disjunct patches of miombo in the area, considerable variations are evident in shrub, forb and grass species composition. A Hierarchical Cluster Analysis on the species composition resulted in a separation of miombo into nine sub-types, largely based on the variations in the herbaceous and understorey composition. An ordination analysis shows the importance of edaphic factors, fire and large mammal herbivory in influencing small-scale variations in species composition of miombo woodland. The implications for biodiversity conservation in miombo are discussed.

B.Y. D-M. MASENS

[Poster -AREAS1]

Institut Supérieur Pédagogique de Kikwit, Rép. Dém. du Congo

Notes analytiques et comparatives sur la flore et la végétation de la région de Kikwit (R.D.Congo)

Des inventaires botaniques ont été effectués depuis 1990, dans la flore et la végétation de la région de Kikwit à l'aide de la méthode sigmatiste de Braun-Blanquet et/ou de récoltes ponctuelles.

Ils ont permis de recenser 1550 taxons, répartis en 658 genres et 141 familles. Parmi ces taxons on compte 40 Ptéridophytes et 1510 Spermatophytes.

Une comparaison de ces données avec les travaux antérieurs (Léonard 1994, Lubini et al. 1990, 1991, Inventaire d'herbiers cfr. Pauwels 1996, BR) sur la flore de l'Afrique centrale, nous a permis de nous rendre compte de l'état d'avancement des études botaniques dans cette région insuffisamment explorée et du progrès qui reste à accomplir en ce domaine.

J.-P. MATE Mweru¹ & N. NDIANGO²

[Poster -AREAS1]

¹ Laboratoire de Botanique systématique et de Phytosociologie, Université Libre de Bruxelles, Belgique

² Laboratoire de Botanique, Faculté des Sciences, Université de Kisangani, Rép. Dém. du Congo.

Phytodiversité de la forêt primaire à *Gilbertiodendron dewevrei* (Réserve forestière de Masako, R. D. Congo)

L'étude de la phytodiversité de la réserve forestière de Masako a été effectuée à Kisangani en utilisant la méthode des transects. Les végétaux ligneux à dbh (diamètre at breast height ou diamètre à hauteur de la poitrine, c'est-à-dire à 1,30 m de hauteur au-dessus du sol) supérieur ou égal à 10 cm ont été recensés et quantifiés sur un hectare. Six relevés phytocénologiques de 100 m² de surface chacun ont été effectués dans le sous-bois en vue de caractériser cette strate.

Au total 364 individus à dbh ≥ 10 cm ont été inventoriés et couvrent une surface terrière de 40,16 m² à l'hectare dont la moitié est occupée par les seuls pieds de *Gilbertiodendron dewevrei* qui présentent une

dominance relative élevée (46,3 % du total). Ces individus appartiennent à 67 espèces réparties en 25 familles. Les Caesalpiniaceae sont de loin les plus dominantes mais sont représentées seulement par 5 espèces. Les Euphorbiaceae, Annonaceae et Sapotaceae sont représentées par 6 espèces chacune ; chez les Euphorbiaceae, les espèces *Uapaca guineensis*, *Ricinodendron heudelotii* et *Drypetes gossweileri* sont les plus abondantes ; les Annonaceae sont essentiellement représentées par *Anonidium mannii*, *Isolona bruneelii* et *Polyalthia suaveolens* ; les Sapotaceae par *Tridesmostemon claessensi* et les espèces du genre *Gambeya*. Viennent ensuite les Meliaceae, 4 espèces dont *Trichilia welwitschii* et *Guarea cedrata* ; les Moraceae, 4 espèces dont *Trilepisium madagascariense* et *Treculia africana* ; les Sapindaceae, 4 espèces dont *Chytranthus carneus* et *Pancovia harmsiana* ; les Myristicaceae, 3 espèces dont *Coelocaryon preussii* et *Staudtia gabonensis*.

Le sous-bois de cette forêt est essentiellement dominé par l'espèce *Scaphopetalum thonneri*. Au total 94 espèces appartenant à 39 familles ont été inventoriées dans 600 m² de sous-bois dont 22 constituent la régénération des ligneux à dbh > 10 cm relevés ci-dessus. Les familles les plus diversifiées dans cette strate sont : les Connaraceae (*Rourea viridis*, *Agelaea* div.sp. et *Roureopsis obliquifoliolata*), Rubiaceae (*Canthium hispidio-nervosum*, *Bertiera breviflora* et *Rothmannia hispida*), Euphorbiaceae (*Alchornea floribunda*, *Pycnocomia insularum* et *Manniophyton fulvum*), Sterculiaceae (*Scaphopetalum thonneri*, *Cola* div.sp. et *Pterygota bequaertii*), Menispermaceae (*Penianthus longifolius*, *Triclisia gillettii* et *Epinetrum villosum*) et Marantaceae (*Trachypogon braunianum*, *Haumania leonardiana* et *Thaumatococcus daniellii*).

Pour l'ensemble des strates, 139 espèces réparties en 45 familles ont été recensées pour un hectare. La relative pauvreté spécifique de ce type forestier par rapport à d'autres forêts denses s'explique essentiellement par la dominance du *Gilbertiodendron dewevrei* qui laisse peu d'espace aux autres espèces.

MBOLO & AMOUGOU Akoa

[Poster -PHYTO2]

Université de Yaoundé I, Faculté des Sciences, Yaoundé, Cameroun

Carte de la végétation de la Réserve de la Biosphère du Dja

Grâce à des photographies aériennes datant de 1989-1991 du projet ACIDI (Agence Canadienne pour le Développement International) 232-08002, une carte de la végétation au 1/20 000 dans la périphérie et zone Est de la Réserve de la Biosphère du Dja a été réalisée. L'observation minutieuse de ladite carte met en évidence l'existence de nombreuses formations végétales. Celles-ci diffèrent par : la composition floristique, l'âge, la structure...

L'imbrication de ces formations est particulièrement intéressante. Il est possible qu'elle permette d'établir leur phylogenèse du point de vue structural, et très probablement le parcours de certains grands mammifères tels les éléphants.

P.K. MBUGUA

[Lecture- SYST1]

Kenyatta University, Botany Department, Nairobi, Kenya

Revision of the genus *Sansevieria* (Dracaenaceae)

The nomenclatural history and the first revision of *Sansevieria* Thunb. account is presented. The last account was by N.E. Brown, who worked on Kew Herbarium materials in 1915. A number of taxa nov. and comb. nov. are presented. The new distribution patterns hitherto unknown to science are presented in form of maps. The relationship between the genus *Sansevieria* and *Dracaena* is discussed and conclusions drawn from the research findings. The importance of the genus and some common uses especially in Kenya are discussed. Some species survival indices and the necessary measures to conserve these hardy xerophytes are presented.

M. MOELLER

[Lecture - SYST3]

Royal Botanic Garden Edinburgh, Edinburgh, U.K.

Phylogenetic studies in *Streptocarpus* (Gesneriaceae)

Molecular phylogenies have been generated to investigate morphological changes during the evolution of *Streptocarpus* Lindl., the largest genus of Gesneriaceae in Africa. Of the around 135 species of *Streptocarpus* described, 77 have been included in a parsimony analysis using the internal transcribed spacer (ITS) of

ribosomal DNA. The studies show that *Streptocarpus* is paraphyletic and at least three other taxa are nested within the genus. The resulting phylogenetic relationships are congruent with the cytology. However, incongruence occurs in relation to the subgenus division. *Streptocarpus* is currently divided into two subgenera, *Streptocarpella* and *Streptocarpus*, mainly on morphological grounds. Of particular interest are the evolutionary changes in gross morphology, such as the occurrence of the distinctive 'unifoliate' types in which the entire above ground vegetative plant body is formed from a single cotyledon. The molecular data show that there are several independent origins for this morphology and the 'rosulate' growth forms, and they are thus not homologous but represent convergence events. The ancestral habit of *Streptocarpus* could not be elucidated unequivocally, but there is some indication that the caulescent form is plesiomorphic, as woody caulescent taxa are basal to the clade of non-caulescent species of subgenus *Streptocarpus*. Some evidence suggest an origin of the genus on Madagascar and a subgeneric split before their migration to mainland Africa (which incidentally does not coincide with the geological separation) and a southwards migration and speciation of subgenus *Streptocarpus* in Africa. Based on nuclear rDNA (ITS) and chloroplast trnL-F intron-spacer data, however, the four Asian taxa described appear not to be closely related to the African species.

M. MOSANGO, O. MAGANYI & M. NAMAGANDA
Makerere University, Department of Botany, Kampala, Uganda

[Poster -VAR1]

A floristic study of weeds of Kampala (Uganda)

A floristic study of invasive species was carried out in Kampala (Ug.). The aim of the study as to come up with a computerised catalogue of invasive species of Kampala. An inventory was made throughout Kampala man-made habitats and voucher specimens were collected. A total number of 331 species was identified. These species belong to 203 genera and 66 families. The most important families were Asteraceae (45 sp.), Poaceae (44 sp.) and Papilionaceae (31 sp.). Most of the species are therophytes (38.1 %) and of pantropical distribution (46.6 %).

Une étude floristique des adventices à Kampala (Ouganda)

Un inventaire floristique des plantes adventices a été réalisé à Kampala en Ouganda. Cette étude avait pour objectif de déterminer ces espèces et de définir leurs types biologiques et distribution géographique et d'établir un catalogue informatisé de toutes ces espèces. Un herbier de ces plantes adventices a été constitué et conservé à l'Herbarium du Département de Botanique de l'Université de Makerere. Au total 331 espèces ont été identifiées. Elles sont réparties en 66 familles et 203 genres. Les familles des Asteraceae (45 espèces), Poaceae (44 espèces) et Fabaceae (31 espèces) se sont révélées comme les plus importantes. Le spectre biologique est dominé par des plantes annuelles ou thérophytes (38,1%). Le spectre géographique, par contre, est dominé par des espèces pantropicales (46,6 % du total).

Dominique Claude MOSSEBO
University of Yaoundé I, Mycological Laboratory, Yaoundé, Cameroun

[Poster - MACRO1]

Ecology and systematic revision of the genus *Termitomyces* (tropical Basidiomycetes) in Cameroon: a preliminary study

Some pond edible species of mushrooms growing exclusively in the tropics could be collected during the rainy season in the forest and savannah regions of Cameroon.

They belong to the genus *Termitomyces*, family of Amanitaceae (Basidiomycetes), and are characterized by a small to very large pileus generally bearing a more or less prominent umbo called periumbrinum and a central and solid stipe producing a long underground pseudorrhiza.

Their other characteristic is that they are exclusively symbiotic species living in symbiosis with termites on or around termitearies built by the latter.

The symbiotic exchange occurs on the fungus comb on which the mushroom takes its origin and there is a specific relationship between the species of termite, the nature and architecture of the fungus comb and the species of *Termitomyces* growing on it.

This preliminary study aims at a better understanding of the ecology of the genus *Termitomyces* as well as a systematic revision of the species growing in Cameroon.

Out of the about 12 to 15 species of *Termitomyces* known in Africa and parts of Asia, about eight have so far been reported in Cameroon (Heim 1952).

This poster presents the first colour plates of some of the most frequent species in the country in their natural habitat, a revised account of their macroscopic and microscopic characters – the ones so far described being insufficient or lacking accuracy in some important details –, as well as the characteristics of the fungus comb on which they grow.

Dominique Claude MOSSEBO

[Lecture - MACRO1]

University of Yaoundé 1, Mycological Laboratory, Yaoundé, Cameroun

Diversité de la flore des Agaricales et des Polyporales (Basidiomycètes) du Cameroun: une étude préliminaire

La flore mycologique du Cameroun comme celle de la plupart des pays d'Afrique au sud du Sahara, pourtant très riche et diversifiée, est jusqu'à ce jour plutôt mal connue, contrairement par exemple à celle des végétaux supérieurs. À part quelques rares études parcellaires faites çà et là par quelques rares auteurs isolés et cela généralement depuis plusieurs dizaines d'années, il n'existe à ce jour à proprement parler aucun document sur la flore des champignons du Cameroun, les seules études fiables effectuées dans la zone de l'Afrique centrale ayant été faites essentiellement dans la région des grands lacs (Congo Démocratique (ex Zaïre), Rwanda, Burundi) de cette partie de l'Afrique.

C'est pour essayer de combler ce vide qu'une vaste étude taxonomique de la flore des macromycètes du Cameroun a été entreprise avec pour point focal les Agaricales et les Polyporales. Ainsi, de quelques excursions déjà menées essentiellement dans les régions du Centre, Sud, Ouest et Littoral du pays, il se dégage de la détermination de quelques uns des spécimens collectés une grande diversité de la flore des Agaricales et des Polyporales existant au Cameroun.

Pour ce qui est des Agaricales, on note dans toutes les régions sus citées entre autres une forte présence de *Marasmius* spp. et *Marasmiellus* spp. ainsi que des *Psathyrella* spp. et *Coprinus* spp. Les *Lentinus* spp. présentent également un potentiel d'espèces important surtout dans les régions Centre, Sud, Est et Ouest du pays. On relève aussi une dizaine d'espèces de *Termitomyces* essentiellement dans les quatre régions sus citées avec une répartition géographique des espèces bien déterminée. D'autres Agaricales appartenant notamment aux genres *Agaricus* spp., *Leucagaricus* spp., *Lepiota* spp., *Macrolepiota* spp., et bien d'autres ont été recensés dans diverses régions du pays.

Concernant les Polyporales, on relève une forte présence de Ganodermataceae avec surtout les *Ganoderma* spp., très nombreux et diversifiés et quelques *Aniarridermia* spp. surtout dans les régions Centre, Sud et Est du pays. Chez les Polyporaceae qui sont de loin les plus nombreux, on note une très grande diversité des espèces surtout dans les régions forestières et appartenant aux genres *Trametes* spp., *Coriolopsis* spp., *Phellinus* spp., *Polyporus* spp., *Fomitopsis* spp., *Irpex* spp., *Cerrena* spp., *Rigidoporus* spp., *Stereum* spp., *Nigrofomes* spp., *Microporus* spp., etc..

Tout ceci ne constitue que des données préliminaires qui seront actualisées au fur et à mesure que les espèces collectées seront déterminées et les diverses régions du pays explorées.

N. MOULAERT¹, F. RAKOTONDRAINIBE², G. BOUXIN³

[Lecture - AREAS4]

¹ Faculté Universitaire des Sciences Agronomiques de Gembloux, Biologie végétale, Gembloux, Belgique

² Muséum d'Histoire Naturelle, Laboratoire de Phanérogamie, Paris, France

³ Erpent, Belgique

Diversité et distribution des pteridophytes dans la forêt oro-océanique de l'île de Mohéli (Comores)

L'archipel des Comores connaît depuis plusieurs années une dégradation de ses écosystèmes forestiers, caractérisés par un endémisme remarquable. Les pressions anthropiques exercées sur les milieux naturels ne cessent de croître, en particulier sur la forêt de Mohéli. La destruction de celle-ci entraînerait, notamment, l'extinction d'espèces endémiques. Aussi, tenant compte de cette réalité, l'étude des pteridophytes menée au

sein de la forêt de Mohéli contribue à la connaissance et également à la conservation de la diversité biologique aux Comores.

Dans un premier temps, un inventaire des pteridophytes est réalisé sur l'île de Mohéli; le nombre d'espèces recensées sur l'île se voit ainsi quintupler. Ensuite, des relevés sont effectués dans chacune des formations forestières identifiées au sein de la forêt. La diversité de la flore pteridologique est étudiée via la richesse spécifique, la densité, des coefficients de similitude et des diagrammes rangs fréquences. La distribution des taxons au sein des formations est également analysée, deux gradients regissant cette distribution sont identifiés et quantifiés. Des espèces caractéristiques d'une ou plusieurs formations forestière(s) sont mises en évidence. Enfin, l'impact/l'importance de cette étude des pteridophytes dans la conservation et la gestion de la diversité biologique aux Comores est discutée.

G.M. MUNGAI

[Poster - FLOR2]

The East African Herbarium, National Museums of Kenya, Nairobi, Kenya

Systematics and landscaping; an applied role in Herbaria and Botanic Gardens

Abstract not received.

A. Muthama MUASYA^{1,2}, David A. SIMPSON¹ & Mark W. CHASE¹

[Lecture - SYST3]

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Circumscription and evolution in *Cyperus* s.l. (Cyperaceae): evidence from molecular data

Generic delimitations in *Cyperus*, one of the largest genera of Cyperaceae in tropical Africa, is contentious.

The genus has been treated, broadly or narrowly, to include *Kyllinga* and *Pycnosus* as subgenera of *Cyperus* or as distinct genera. Determination of relationships is difficult on gross morphology alone as the highly reduced flowers and condensed inflorescence have led to different interpretations due to uncertain estimates of homology. In this study, plastid DNA sequence data (*rbcL*, *trnL-F* and *rp16* intron) are used to infer the phylogeny and then to evaluate the monophyly and relationships in *Cyperus* s.l. The DNA sequence data were collected using standard techniques and analysed using the parsimony algorithm in PAUP. *Cyperus* s.l., circumscribed to recognise *Kyllinga* and other entities as distinct genera, is not monophyletic as ten cyperoid genera are embedded in it. *Cyperus* species with a C3 anatomy and the eucyperoid genera *Courtosina*, *Kyllingella* and *Oxycaryum* form a clade sister to species with a C4 anatomy and the chlorocyperoid genera *Almida*, *Arcolepus*, *Kyllinga*, *Lycoparpha*, *Pycnosus*, *Remirea* and *Sphaerocarpus*. Should *Cyperus* be treated monophy and the two clades diagnosed by anatomy (i.e. C3 versus C4) be recognised as subgenera? Moreover, one species with typical *Cyperus* morphology (spikelets distichous) is resolved to be embedded in the *Iscolepus* clade (spikelets verticillate), thus moving doubt on the value of spikelet morphology in diagnosing the genera. Character evolution, especially leaf anatomy, spikelet and flower morphology, will be discussed in light of the molecular phylogeny.

Jens MUTKE¹, Gerold KIEB¹, Gerald BRAUN² & Wilhelm BARTHOLOTT¹

[Poster - PHYTO2]

¹ Botanical Institute, University of Bonn, Bonn, Germany

² German Remote Sensing Data Centre, (DFD/DLR), Cologne, Germany

Patterns of African phytodiversity in a global context

The knowledge on and the analysis of the spatial patterns of biodiversity are important prerequisites for its conservation, further investigation and sustainable use. In 1996 we published a world map of species numbers of vascular plants on a standard area of 10,000 km² (slightly revised version: Barthlott et al. 1999). We now present preliminary results of a complete revision of this map as well as some additional analyses on the correlation of biodiversity with abiotic parameters (the geodiversity).

The database used for the world map of species richness was enlarged by 50 % since 1996 and contains now some 2800 records on more than 2100 geographical units world-wide (c. 460 for Africa). This information is linked to a geographical information system with data on vegetation, topography and climate.

The species numbers found in different geographical units with different area sizes were standardised using the species-area model by Arrhenius. Based on multiple regression analyses, models of the relation of species numbers to abiotic parameters and the geodiversity were computed. For the final map, the species richness is interpolated for areas without appropriate data depending on the distance to the areas of known species numbers and depending on the similarity of the abiotic parameters to these areas.

The overall pattern of increasing plant species richness with decreasing latitude is modified mainly by areas of higher diversity along mountain systems and in regions with mediterranean-type climate. The multiple regression analyses for the different floristic regions show high correlation to mean temperature, annual precipitation, seasonality and climadiversity. For Africa, besides the Afromontane Region and the Atlantic Equatorial Forests, the Capensis forms the most important centre of phytodiversity – not only regarding species numbers but as well for other qualitative aspects of biodiversity.

In addition we present a map of African geodiversity, based on the spatial heterogeneity of topography, climate and soils. Centres of biodiversity correspond in many cases with regions of high geodiversity due to the resulting high floristic heterogeneity (the high beta diversity) in these areas.

E. MWENJE & S. VAN OOSTERHOUT
SALRED, Harare, Zimbabwe

[Poster - SYST3]

Molecular analysis of biodiversity in wild, weedy and domesticated *Sorghum bicolor*

Samples of wild, weedy and domesticated *Sorghum bicolor* were collected from eight countries in the Southern-African region and analysed by molecular methods (RFLP and RAPIDS). Questions on the origin and spread of domesticated sorghum are addressed in relation to the distribution of wild sorghums.

P. NDABANEZE
Université du Burundi, Bujumbura, Burundi

[Poster - FLOR2]

Le Jardin botanique de l'Université du Burundi : son rôle dans la formation en systématique

Le Jardin botanique de l'Université du Burundi vient d'être créé. Son objectif principal est la connaissance de la richesse floristique du Burundi. D'autres buts sont poursuivis, notamment le but didactique, scientifique (recherche), culturel, la conservation de la nature. Le jardin botanique constitue un instrument didactique non seulement pour les étudiants de l'Université mais également pour les élèves des écoles secondaires de Bujumbura et des environs pour le cours d'étude du milieu.

N. NDAM¹, J. R. HEALEY², P. FRASER² & M. CHEEK³

[Poster - AREAS3]

¹ Limbe Botanic Garden, Cameroon

² University of Wales, Bangor, UK.

³ Royal Botanic Gardens, Kew, UK.

Colonisation of lava flows and subsequent succession: a case study of the 1922 and 1959 lava flows

1. The study was undertaken by a team of botanists from the Limbe Botanic Garden and the Royal Botanic Gardens, Kew in 1995 under the direction of the above authors.
2. Data were analysed and written up by N. Ndam as a chapter for his PhD. thesis. The authors are reviewing the write up for joint publication in a scientific journal.
3. The research assessed the role of volcanic eruptions in the maintenance of species richness on Mount Cameroon.
4. It also investigated the resulting course of primary succession and the mechanisms controlling it.
5. Results of the 1995 vegetation census on the 1922 and 1959 lava flows were compared with those of surveys carried out in 1936/37 and 1951.
6. Plants and species numbers were significantly different between the two lava flows ($P = 0.001$) and there was a tendency of woody species > 1 cm DBH to colonise from the edges of the flow towards the centre whereas the distribution of herbaceous plants seems to reflect a more stochastic colonisation process.

7. The primary succession process was complex with a high turnover of species, larger number appearing and disappearing from the lava flows between 1936 and 1995 than numbers persisting throughout. The results are compatible with a relay floristics model of succession. However, given the slow rate of vegetation development of the sites it is questionable whether the high rate of species turnover reflects mechanisms of facilitation and then competitive exclusion. It may be more of a reflection of stochastic processes in the populations of the species.

8. Analysis of current trend of species composition, basal areas and density indicated that it could take 300 to 600 years for the initial forest to be reconstituted on those lava flows.

9. About 8% to 18% of species colonising the lava flows are unique to this type of environment, therefore contributing constantly to the richness of the biodiversity on Mount Cameroon.

The authors and the Limbe Botanic Garden, Mount Cameroon Darwin collaborative Project (1994-1997) acknowledge the financial support of the UK Darwin Initiative for the survival of species and the Scientists from RBG, Kew, UK.

N. NDAM¹, J. R. HEALEY², M. CHEEK³ & P. FRASER²

[Poster - AREAS3]

¹ Limbe Botanic Garden, Cameroon

² University of Wales, Bangor, UK.

³ Royal Botanic Gardens, Kew, UK.

Impact of shifting cultivation on Mount Cameroon biodiversity: a case study at Likombe

To assess the impact of shifting cultivation on Mount Cameroon biodiversity, 400 m² plots were established in 27 abandoned farms grouped into five different age classes (0-2, 3-5, 6-10, 11-30 and > 30 years) were monitored over four years along with three 400 m² plots primary forest plots. Three stages of secondary succession were observed through which pioneer and mid-successional species dominated the initial floristic composition of fallows and shade bearing species only arrived slowly as fallows age (up to 100 years). These shade bearers only accounted for at most 40% of plant density of the older fallow vegetation. The main relatively abundant species were mainly *Harungana madagascariensis*, *Solanum torvum* and *Vernonia conferta* during the first five years then large individuals of *Cecropia peltata*, *Macaranga occidentalis*, *Musanga cecropioides* and *Polyscias fulva* on old fallows. Species richness increased over time but was still c. 20% below the primary forest level even on older fallows. The density and rate of accumulation of shade bearer species permitted an estimate of 150 to 250 years for fallows to recover to the condition of the initial forest in zones close to the village whereas it will only take 30 to 40 years in the zone away from the village, adjacent to primary forest. Species richness and density of plants on fallows close to the undisturbed forest were significantly greater than that on fallows away from the forest ($p < 0.046$). However shifting cultivation can contribute to the mountain biodiversity: it was observed that it can accelerate succession to forest from post disturbance grassland. Also, old fallow vegetation proved to be an important habitat for certain endemic/rare species (e.g. *Neoschumania kamerunensis*). Recommendations include: improved location of farm sites leaving patches of viable forest stands as seed sources on farmland, improved clearing system leaving more standing trees and cutting some shrubs at a greater height (e.g. 1.5 m) to facilitate sprouting during the fallow period, composting of cleared vegetation instead of burning and planting, and incorporation of needed tree species into the farming system.

The authors and the Limbe Botanic Garden, Mount Cameroon Darwin collaborative Project (1994-1997) acknowledge the financial support of the UK Darwin Initiative for the survival of species and the International Foundation for Science, Sweden.

N. NDAM¹, J. NKEFOR & P. BALCKMORE

[Poster - PLANT1]

¹ Limbe Botanic Garden, Cameroon

Conserving eru (*Gnetum africanum* and *G. buchholzianum*), an over-exploited NTFP from the forests of Central Africa: a case study of Cameroon

Gnetum africanum and *G. buchholzianum* are species in the family Gnetaceae. The leaves of both species are 'vegetables'. They constitute a very important commercial non timber forest product in Central Africa particularly in Cameroon where they are traded as green vegetables in local, regional and external markets. This resource has been seriously threatened by unsustainable harvesting methods and the gradual

disappearance of the forests in which they occur. In order to ensure and enhance the sustainability of these species, a production to consumption system of the species has been studied; effort of conservation through cultivation initiated. The papers describe the market chains and achievement of the domestication efforts.

NDJELE Mianda-Bungi

[Poster - AREAS1]

Université de Kisangani, Faculté de Sciences, Kisangani, Rép. Dém. Congo

Le projet de conservation de la forêt primaire de l'île Mbiye à Kisangani, R. D. Congo

La forêt de l'île Mbiye constitue l'écosystème forestier le plus proche de la ville de Kisangani. Cet écosystème est actuellement très menacé de disparition suite aux activités humaines: agriculture itinérante sur brûlis, charbon de bois, bois de construction et d'ébénisterie, plantes médicinales, etc... Le projet qui envisage de préserver la forêt primaire de cette île, se base sur des arguments scientifiques d'abord: plantes utiles inventoriées, phytodiversité par la méthode des transects; ensuite mène des activités de Sensibilisation des Décideurs (Service de l'Environnement) et sensibilisation de la population paysanne. Des actions vigoureuses d'Agroforesterie et de Reforestation sont en cours de réalisation.

NDJELE Mianda-Bungi

[Poster - MACRO1]

Université de Kisangani, Faculté de Sciences, Kisangani, Rép. Dém. Congo

Synthèse de la recherche sur la flore fongique (Macromycètes) de Kisangani et ses environs

Résumé non reçu.

NDJELE Mianda-Bungi

[Poster - PLANT1]

Université de Kisangani, Faculté de Sciences, Kisangani, Rép. Dém. Congo

Synthèse de la recherche sur la flore médicinale de Kisangani et ses environs

Résumé non reçu.

Georgina NETO & Esperança COSTA

[Poster - FLOR2]

University Agostinho Neto, Faculty of Science, Luanda, Angola

Angolan Herbaria

This work deals with a historical review of Angolan Herbaria, their present status and prospects. Presently support is given by SABONET (Southern African Botanical Diversity Network), concerning training Courses and the equipment.

The computerization of specimens data and the new integration of Luanda Herbarium in SECOSUD "Service for Environmental Conservation of Biodiversity and Development" project are also referred.

Attention is given to some future projects of Angolan Herbaria.

G. N. NJORGE

[Lecture - SYST1]

Jomo Kenyatta University, Botany Dept., Nairobi, Kenya

Diversity of *Solanum* section *Solanum* in Kenya

Among scientists and even development programs we have a group of quite unrelated plants usually put together as the African spinach. Plants in this category are important sources of green vegetables in Africa. These plants are either crops or semi-wild plants cultivated by many African communities as vegetables. Some samples have been collected and conserved in various Genebanks. Characterization and evaluation of germplasm by scientists reveals its diversity (variability). This variability is of great importance to food security: Genetic diversity/variability is also important for plant breeding programs. Intraspecific and interspecific diversity of *Solanum nigrum* L. is here analyzed using morphological markers. The populations are as represented in the germplasm collection of the Gene Bank of Kenya.

On the basis of this characterization the collection lumped as *Solanum nigrum* seems to represent three distinct taxa. Other variations are revealed, which is an indication of the wide genetic diversity of these materials.

G. N. NJORGE

[Poster - PLANT1]

Jomo Kenyatta University, Botany Dept., Nairobi, Kenya

Role of *Solanum* species to East African people

Indigenous use of wild species of the *Solanum* genus is here reported. Local names in the various languages are presented to ease germplasm collection in the wild habitats of Kenya. Utilization of 29 species is reported and where possible methods of preparation are included. The highest utility was found to be medicinal.

The data are useful in targeting species for conservation as well as for harvesting for natural products intended for commercial use. The data also exposes the vital role that wild plants may play in future economic development. This documentation serves to conserve traditional ecological knowledge before it disappears.

Bernard-Aloys NKONGMENECK

[Lecture - PLANT1]

Université de Yaoundé I, Faculté des Sciences, Yaoundé, Cameroun

Les forêts sacrées des régions de l'Ouest et du Nord-Ouest du Cameroun et leur rôle en systématique

Les populations des régions de l'Ouest et du Nord-Ouest du Cameroun conservent des reliques de forêts dites forêts sacrées. Ces forêts reliques sont conservées pour des raisons médicinales, socio-culturelles et parfois mystiques.

Lorsque ces forêts sacrées sont utilisées comme support pour des séances d'initiation, initiation dans l'apprentissage des espèces utilisées en pharmacopée traditionnelle, elles jouent par ce fait un rôle très important en systématique.

Jean S. N'KOUNKOU

[Poster - VAR1]

Laboratoire de Botanique, CERVE, Brazzaville, Rép. Pop. Congo

Les Corolliflorae de la Réserve de la Léfini (Congo-Brazzaville)

L'inventaire des plantes en fleurs de la Réserve de la Léfini en vue de l'élaboration du Guide Botanique de la Léfini, dans le cadre du Projet Gef-Congo financé par la Banque Mondiale, a permis de recenser six Familles du Super Ordre des Corolliflorae. Ces familles sont représentées par huit genres avec onze espèces en période de floraison: *Gladiolus unguiculatus* (Iridaceae), *Biophytum abyssinicum*, *B. mimosella* (Orchidaceae), *Asparagus africanus*, *Gloriosa superba* (Liliaceae), *Haemanthus multiflorus* (Amaryllidaceae), *Dioscorea liebrechtsiana*, *D. mangenotiana*, *D. schimperiana*, *D. smilacifolia* (Dioscoreaceae) et *Aloe buettneri* (Aloeaceae).

Pour chaque espèce, la distribution et l'habitat sont esquissés. Une observation est faite des familles des Corolliflorae non inventoriées en fleurs et leur absence est discutée par rapport à leur distribution dans le Secteur de transition Congolo-Zambézien.

H. NTAHOBAVUKA

[Lecture - SYST2]

Université de Kisangani, Faculté des Sciences, Rép. Dém. Congo

Etude palynologique des Malvales en République Démocratique du Congo

L'étude morphologique des pollens de l'ordre des Malvales a été faite sur base du matériel récolté sur terrain ou dans les herbariums.

La technique utilisée est l'acétolyse suivie de l'observation des pollens aux microscopes photonique et électronique à balayage.

Palynological study of Malvales in the Democratic Republic of Congo

The morphological study of Malvales order pollen was undertaken on the basis of field or herbarium materials.

The technique used was acetolysis followed by photonic and scanning electronic microscope observations.

Les résultats suivants ont été obtenus. La famille Bombacaceae est caractérisée par deux types polliniques à pollens bréviaxes, grands. Le premier type a des pollens tricolporés, courtement échinulés. Le second type est constitué des pollens tricolpés à exine réticulée.

La famille Malvaceae renferme des espèces à pollens équiaux échinulés et polyporés excepté le genre *Abutilon* qui possède des pollens tricolporés. La variation des pollens concerne les dimensions et la morphologie des épines. Cette famille est caractérisée par trois types polliniques qui correspondent parfaitement avec les trois tribus de la famille.

La famille Sterculiaceae est caractérisée par huit types polliniques. Elle comporte des espèces à pollens bréviaxes, équiaux ou subéquiaux tricolporés ou multicolporés. L'exine est échinulée, courtement échinulée, finement réticulée, très finement réticulée, verruqueuse ou très finement réticulée et verruqueuse à la fois. Dans la famille Sterculiaceae le type pollinique caractérise la tribu, le genre ou les espèces. Les genres *Cola* et *Pterygota* renferment des espèces possédant des types polliniques différents. Les espèces *Cola gigantea* et *C. lateritia* ont des pollens semblables à ceux du genre *Sterculia*.

La famille Tiliaceae est caractérisée par 4 types polliniques qui ne correspondent pas aux tribus de la famille.

A la lumière de cette étude pollinique les genres *Duboscia* et *Christiana* pourraient être groupés dans une même tribu et les sections *Microcos*, *Eugrewia* et *Vinticena* élevées au rang de genre...

La famille Sterculiaceae a des proches affinités avec les familles Bombacaceae, Malvaceae et Tiliaceae.

The following results were obtained : Bombacaceae family is characterized by two pollen types with oblate and large pollens. The first type has triporate and shortly echinulate pollens. The second type is constituted with tricolporate pollen with reticulate exine.

Malvaceae family contains spheroidal, echinulate and polyporate pollen species except for *Abutilon*, which has tricolporate pollens. The pollinic variation concerns the size and the spine morphology. This family is characterized by three pollen types which are related to the three family tribes.

Sterculiaceae family is characterized by eight pollen types. It includes the species with oblate, spheroidal, subspheroidal, porate, triporate or multicolporate pollens. The exine is very finely reticulate, finely reticulate, echinulate, verrucate or both very finely reticulate and verrucate. In this family, pollinic type is characterized of the tribe, genus or species. *Cola* and *Pterygota* genera contain species which have different pollinic types. *Cola gigantea* and *C. lateritia* species pollens are similar to those of *Sterculia* genus.

Tiliaceae family is characterized by four pollen types without specific relation to the family tribes. In the light of this pollen study, *Duboscia* and *Christiana* genera could be grouped in one tribe. The genus *Grewia*, which is characterized by three pollen types, could be elevated on the tribe level and *Microcos*, *Eugrewia* and *Vinticena* sections on the genus level.

Sterculiaceae family has close relationships with Bombacaceae, Malvaceae and Tiliaceae.

NYAKABWA M. & MBATE K.

Université de Kisangani, Centre Universitaire de Bukavu, Rép. Dém. Congo

Les espèces de *Ficus* dans l'agglomération urbaine de Kisangani (R.D. Congo)

L'étude a abouti à l'inventaire floristique et à la description de 40 espèces (des 93 actuellement connues dans la flore de la République Démocratique du Congo) et deux variétés réparties en quatre sous-genres (*Syncomorus* Casp., *Sycidium* Mig., *Urostigma* Casp. et *Bibracteata* Mildbr. et Burret) au sein du genre *Ficus* dans l'agglomération urbaine de Kisangani.

The species of *Ficus* in the urban area of Kisangani (R. D. Congo)

The study led to the floristic inventory and the description of 40 species (of the 93 presently known in the R.D.C. flora) and two varieties, divided into four subgenera (*Syncomorus* Carp., *Sycidium* Mig., *Urostigma* Casp. and *Bibracteata* Mildbr. and Burret) within the genus *Ficus* in the urban area of Kisangani.

[Poster -VAR1]

La description taxonomique est centrée sur les caractères de différents organes. Des clés dichotomiques de détermination, portant séparément sur les caractères végétatifs et reproducteurs, sont établies.

The taxonomic description is centred on the characters of different organs. Dichotomous keys for determination separately on vegetative characters and reproductive characters are established.

C. OBAMA

CUREF, Herbar national, Bata, Litorale, Guinée Equatoriale

[LECTURE + POSTER -AREAS1]

Analyse phytogéographique des ligneux du Rio Muni (Guinée Equatoriale)

Un inventaire des arbres du Rio Muni a été réalisé (soit environ 300 espèces). Une analyse de leur distribution dans les neuf territoires géographiques reconnus au Rio Muni est effectuée et met en évidence l'importance de trois gradients principaux selon l'altitude, la latitude et la longitude.

Eileen M. O'BRIEN & John B. HALL

University of Wales, School of Agricultural and Forest Sciences, Bangor, UK.

[Lecture - PHYTO1]

Distribution of *Prunus africana* (Rosaceae): implications for White's dispersal routes for Afromontane species

We use a detailed distribution map for *Prunus africana* to consider the origin and spread of this tree – the only member of this large genus native to Africa south of the Sahara. The map is based on locality coordinates for more than 500 voucher specimens. The range is typically Afromontane, extending via escarpment/rift mountains and volcanoes, from the Eastern Cape Province (RSA) to within 250 km of the Gulf of Aden, with extensions into Central Africa (Katanga, DRC: Congo-Zambezi River Basin Divide) and with disjunct populations in western Africa (Cameroon/Bioko and Angola) and in Madagascar/Comoros. Occurrences were interpreted in altitudinal and climatic terms. Then, geologic and paleoenvironmental evidence was used to examine possible dispersal routes and potential source areas.

We conclude that *Prunus africana* is of African paleotemperate origin, with a source area in southernmost Africa. Conditions allowing migration first arose in the Pliocene (5-2 mya), when the southern and eastern continental platforms were tectonically uplifted by ~1000 m to form 'High Africa'. At this time temperature regimes favouring Afromontane biota extended through almost all of southern and much of eastern Africa and opened potential dispersal routes northwards to the mountains of eastern Africa, along the western and eastern flanks of the Congo Basin, and westward to the Angola uplands. More recent Pleistocene oscillations in sea level and climate (ice ages: 2 mya to present) suggest a range that contracted and fragmented during interglacial periods (e.g. the present) but expanded during glacial periods, linking together even relatively distant populations. The longevity of interglacial periods (~10,000 years) compared with glacial periods (~90,000 years) would reduce the potential for speciation as a function of isolation, and explain why there is only one Afromontane species of *Prunus*.

J. OCHORA², W. D. STOCK¹, H. P. LINDER¹ & L. NEWTON³

[Lecture - SYST4]

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Conservation implications of symbiotic seed germination in twelve Kenyan orchids species

Symbiotic methods for germinating *Eulophia* Lindl. and *Polystachya* Hook. seeds from terrestrial and epiphytic habitats respectively were established. Cultures, initiated from the seeds were grown on 2% oat medium and germination medium, alone, or oats medium supplemented with 10 g l⁻¹ banana fruit homogenate and 0.2 g l⁻¹ activated charcoal. The highest germination/differentiation, which took place after 10 days of inoculation, was obtained on the 2% oats medium with glucose (2 g l⁻¹) and NH₄NO₃·4H₂O (1.0 mM l⁻¹) as a source of inorganic nitrogen and supplemented with the additives. Development of protocorms in compatible orchid-fungus combination took place after the second subculture (30 days) from which seedling developed.

The in vitro symbiotic seed germination showed significant tendency towards fungal specificity. Since germination took a shorter time by this technique to develop protocorms, mass propagation of endangered orchids is possible for ex situ conservation programmes.

Elizabeth OMINO

Jomo Kenyatta University of Agriculture and Technology, Dept. of Botany, Nairobi, Kenya

[Lecture - FLOR3]

A review of the past FTEA'S

The *Flora of Tropical East Africa* (FTEA) is anticipated to end in the year 2005. Even though the FTEA is finally drawing to a close, many questions still remain unanswered in some of the already done floras. The department of Botany, Jomo Kenyatta University of Agriculture and Technology is in the process of reviewing the already done floras to come up with some of the most pressing problems e.g. unidentified species, poorly collected species without flowers or even fruits, just to mention a few. The purpose of this on going project is to provide suggestions on how these gaps can be filled and to welcome ideas on what can be done to update and solve these problems without having to redo the already done floras. During the coming AETFAT, some of our findings will be presented with a hope of collecting views from the participants on how this review of the past FTEA's can be sped up.

S. ORTIZ

Laboratorio de Botánica, Facultade de Farmacia, Universidade de Santiago, Santiago de Compostela, Spain

[Poster - SYST1]

An outline of the genus *Geigeria* (Asteraceae, Inuleae)

Objectives. The only existing revision of the genus *Geigeria* Griess. (Asteraceae, Inuleae) is that of Merxmüller (1953). During studies of this genus for the *Conspectus Florae Angolensis*, we have encountered problems relating to taxon delimitation, taxon nomenclature, and infrageneric groupings. Here, we report a preliminary analysis of these problems, as a necessary basis for more detailed studies in the future.

Material and methods. The study was largely based on specimens from BM, COI and K, though some specimens from LISC, LUAI, M, and PRE were also examined. To clarify the taxonomy of particularly problematic groups like the *Geigeria aspalathoides* complex and the *Geigeria plumosa* complex, we performed UPGMA multivariate analyses.

Results. We recognize a total of 20 species: *Geigeria angolensis* O. Hoffm., *G. aspalathoides* S. Moore, *G. decurrens* S. Ortiz & Rodr. Oubiña, *G. acicularis* O. Hoffm., *G. linsyroides*, *G. brevifolia* (DC.) Harv., *G. hoffmanniana* Hiern., *G. spinosa* O. Hoffm., *G. alata* (Hotsch. & Steud.) Benth. & Hook., *G. odontoptera* O. Hoffm., *G. rigida* O. Hoffm., *G. vigintiquamea* O. Hoffm., *G. plumosa* Muschl., *G. pectidea* (DC.) Harv., *G. chenopodifolia* Mattf., *G. acaulis* (Sch. Bip.) Benth. & Hook., *G. africana* Griess., *G. burkei* Harv., *G. elongata* Alston, and *G. mendonçae*. In addition, we recognize 12 subspecies and 7 varieties.

Conclusions. Of the species and subspecies recognized by Merxmüller (1953) and Wild (1980), and in the literature in general, we reject the following: *Geigeria affinis* S. Moore, *G. aspera* Harv., *G. engleriana* Muschl., *G. niaganiensis* Merxm., *G. schinzii* O. Hoffm., *G. schinzii* subsp. *karakovisae* Merxm., *G. schinzii* subsp. *sebungweënsis* Wild., and *G. hoffmanniana* subsp. *obovata* (S. Moore) Merxm.

We describe three new taxa (*G. decurrens*, *G. aspalathoides* subsp. *chorleyana*, and *G. plumosa* subsp. *angustifolia*) and propose five new combinations (*G. plumosa* subsp. *brachycephala*, *G. africana* subsp. *africana* var. *filifolia*, *G. africana* subsp. *rhodesiana*, *G. burkei* subsp. *burkei* var. *rivularis*, and *G. burkei* subsp. *burkei* var. *valida*).

We question Merxmüller's (1953) view that the genus should be subdivided into three series (*Angolenses*, *Pectideae*, and *Africanae*), and propose an alternative infrageneric subdivision.

A.A. OSANO¹, G.M. SIBOE¹, J.O. KOKWARO¹ & J.O. OCHANDA²

[Poster - MACRO1]

¹ Department of Botany, University of Nairobi, Nairobi, Kenya² Biochemistry Department, University of Nairobi, Nairobi, Kenya**Taxonomy of the poroid wood inhabiting basidiomycetous fungi of Karura forest Kenya**

Ryvarden and Johansen in 1980 produced the only and the first critical polypore flora of East Africa. This flora however gave little attention to the host relationships of this fungi, a character which has received a lot of attention recently in the taxonomy of these fungi. Besides, the flora covered a very large area including Ethiopia, Kenya and Tanzania. A full flora can only be achieved by extensive and concentrated collection by many specialists over many years. This first flora, therefore provided a frame work onto which many more species can be added. Many polypores, as is the case of all fungi will escape collection unless one is present at the right times since they are short lived.

This work therefore aimed at extensive collection of these fungi from Karura Forest, covering all seasons and the taxonomic studies of the same including their host relationships as taxonomic criteria (type of rot) among the other taxonomic characteristic.

54 species belonging to 35 genera were studied and described. Two new species of the genera, *Diplomitoporus* and *Wolfiporia* were proposed. The species *daedaliformis* is reallocated to *Diplomitoporus* from *Antrodia* on the basis of decay characteristics.

Revision is proposed for *Schizopora paradoxa*, *S. trichilie*, *Rigidoporus victus*, *Dichomitus leucoplacus*, *Favolus bransilensis*, and the genera *Loweporus* and *Perriporia*.

Madjidou OUMOROU

[Poster - AREAS2]

Laboratoire de Botanique systématique et de Phytosociologie, Université Libre de Bruxelles, Belgique

Diversité des inselbergs du Bénin

Au Bénin existent un peu partout du centre au nord des affleurements rocheux granitiques dénommés «inselbergs». Dans le cadre du présent travail, six de ces inselbergs, situés à une altitude de 300 et 620 m d'altitude, ont été étudiés dans quatre localités situées entre les parallèles 8° 02' et 10° 20' de latitude nord et les méridiens 2° 09' et 2° 37' de longitude est. Il s'agit des inselbergs dénommés «les deux mamelles» près de Savé, Abeokuta et Echokofonveta près de Yaouli, Soubakpérou près de Wari Maro et enfin Soyakpérou et Gnaroukpérou près de Sinendé. L'objectif du présent travail est de donner un premier aperçu des plantes identifiées sur les 6 inselbergs étudiés.

Au total, 215 espèces différentes ont été recensées parmi les 143 relevés phytosociologiques effectués. Ces espèces ont été réparties en 4 groupes: espèces des prairies sèches (67), des prairies humides (14), des forêts claires et savanes (117) et des forêts denses (17). Les espèces herbacées qui participent aux prairies sèches (sensu stricto) c'est à dire celles disposées à proximité de la roche nue sans suintement, sont les plus caractéristiques des inselbergs; *Afrotrilepis pilosa* (Böck.) J. Raynal (Cyperaceae), *Cyanotis lanata* Benth. (Commelinaceae), *Acollanthus pubescens* Benth. (Lamiaceae). Les principales espèces des prairies humides sont *Drosera indica* L. (Droseraceae), *Ophioglossum costatum* R. Br. (Ophioglossaceae), *Utricularia firmula* Welw. ex. Oliv. (Lentibulariaceae), *Anagallis pumila* Sw. (Primulaceae), *Xyris capensis* Thunb. et *X. straminea* Niss. (Xyridaceae), *Lindernia exilis* Philcox et *L. schweinfurthii* (Engl.) Dandy (Scrophulariaceae). Les espèces ligneuses caractéristiques des inselbergs sont *Ficus abutilifolia* (Miq.) Miq. (Moraceae) et *Hymenodictyon floribundum* (Hochst. & Steud.) Robinson (Rubiaceae), la première logeant l'essentiel de ses racines dans les fissures ou anfractuosités rocheuses.

Ingrid PARMENTIER

[Poster - AREAS2]

Laboratoire de Botanique Systématique et de Phytosociologie, Université Libre de Bruxelles, Belgique

Diversité végétale des inselbergs de Guinée Equatoriale continentale

Les inselbergs étudiés sont des affleurements de roches précambriennes granitiques. Les conditions écologiques et microclimatiques particulières de ces

Botanical diversity of inselbergs from continental Equatorial Guinea

The studied inselbergs are Precambrian granite outcrops. The vegetation of these sites is very distinct from surrounding areas as a result of their particular

sites rendent leur végétation très différente de celle qui les entoure. En effet, la région continentale de Guinée équatoriale (Rio Muni) présente un climat équatorial typique et la végétation climacique de cette région est la forêt dense humide. Or, sur les inselbergs on rencontre des pelouses naturelles et des lisières forestières à xérophytes et orophytes, comportant un nombre limité d'espèces communes avec la forêt dense humide environnante. On considère que la présence de ces formations végétales azonales est due à la faible épaisseur du sol (formations édaphiques naturelles) et à l'évapotranspiration potentielle élevée due aux fortes températures que peut atteindre la roche nue exposée au soleil. Ces conditions font des inselbergs du Rio Muni des « îlots xériques » au milieu de la forêt dense humide. La présence de cette végétation très particulière a partiellement une origine paléoclimatique. Pendant la dernière phase glaciaire, une période très sèche entre 19000 et 15000 BP a fortement marqué la végétation de l'Afrique : l'aire de la forêt dense s'est fractionnée et s'est considérablement réduite au profit des savanes. On suppose que pendant la période postglaciaire, lorsque la forêt dense s'est réinstallée, des xérophytes et orophytes ont pu se maintenir en populations isolées sur les inselbergs.

Nous avons étudié 14 inselbergs en Guinée Equatoriale continentale. La plupart surplombe les plaines avoisinantes ; deux d'entre eux, dans la chaîne montagneuse de Niefang, sont des dalles rocheuses, (Monte Alen et Engong). Leur taille est fort variable ainsi que leur élévation par rapport au relief environnant. D'autres facteurs de différenciation entre ces inselbergs sont notamment le pâturage par les buffles, la distance par rapport aux cultures, les précipitations, l'altitude, la continentalité et l'exploitation de la pierre. La végétation des deux dalles rocheuses est très différente de celle des autres inselbergs.

De nombreuses espèces récoltées sur les inselbergs sont saxicoles et se rencontrent sur toutes les formations rocheuses, ou sur des sols peu profonds (donc également sur cuirasses ferrallitiques). Certaines espèces sont endémiques aux inselbergs, mais d'autres sont banales pour la région ou rudérales. Les pelouses des inselbergs comptent peu d'espèces et ce sont souvent les mêmes partout. Par contre, les lisières forestières en bordure d'inselbergs sont très variables d'un site à l'autre et comptent un nombre beaucoup plus important d'espèces dont une partie reste encore à déterminer.

microclimatic and edaphic conditions. Indeed, Continental Equatorial Guinea (Rio Muni) has a typical equatorial climate with the rainforest as the climacic vegetation. However, on the inselbergs, the vegetation is primarily composed of natural grasslands and forest ridges with xerophytes and orophytes, comprising a limited number of species of the rainforest. These azonal plant formations result from the shallow soil and from high evapotranspiration rates due to the high temperature reached by the bare rock when exposed to the sun. These conditions make equato-guinean inselbergs "xeric islands" in the rain forest. This very particular vegetation is likely to have a paleoclimatic origin. In fact, during the last glaciation, a very dry period between 19000 and 15000 BP markedly affected the African forest : the rainforest area was fractionated and reduced while savannahs expanded. After the glaciation, when the forest came back, xerophytes and orophytes could have been maintained as isolated populations on the inselbergs.

We have studied 14 inselbergs in continental Equatorial Guinea. Most of them are located on hills dominating the surrounding plains whereas two of them are rock outcrops in the Niefang mountains (Monte Alen and Engong). Their size and elevation above the surrounding areas are quite variable. Other differentiating factors are grazing by buffaloes, distance to plantations, precipitation, altitude, distance from the ocean, stone quarrying etc. The floristic composition of the two rock outcrops in the mountain is quite different from that of the other inselbergs.

Many species gathered on the inselbergs are saxicoles. They can be found on any kind of rocks. Some are typical of shallow soils and can also be found on ferrallitic crusts. Some are endemic of inselbergs but others are more common in the region or even ruderals.

Inselberg grass-lands are composed of few species, mostly the same on each inselberg. The vegetation of the edges between forest and grasslands is variable from site to site and includes many more species, some of them remaining presently undetermined.

Afrotrilepis pilosa (Böck.) J. Raynal (Cyperaceae) is the dominating species of dry grass-lands on the inselbergs. It is present on all of them, except Monte

Afrotrilepis pilosa (Böck.) J. Raynal (Cyperaceae) est l'espèce dominante des pelouses sèches d'inselberg. On la trouve sur tous les inselbergs étudiés sauf sur la dalle rocheuse de Monte Alèn, et elle est très peu présente sur celle de Engong. On trouve également dans cette pelouse sèche *Gladiolus unguiculatus* Bak. (Iridaceae), *Polystachya odorata* Lindl. var. *trilepidis* Summerh. (Orchidaceae) et *Oreonesion testui* A. Raynal (Gentianaceae). La pelouse mésoxérique et humide est dominée par *Loudetiopsis glabrata* (K. Schum.) Conert (Poaceae), *Eragrostis invalida* Pilger (Poaceae), *Scleria spiciformis* Benth. et *S. aterrima* (Ridley) Nappe (Cyperaceae), ainsi que deux Orchidaceae *Habenaria procera* (Sw.) Lindl. var. *gabonensis* (Rchb. f.) Geerinck et *Polystachya albescens* Ridl.

Les manteaux arbustifs sont généralement occupés par *Memecylon collinum* Jac.-Fél. et *Psychotria peduncularis* (Salisb.) Steyerm., mais sur certains inselbergs, ils sont dominés par des Melastomataceae buissonnantes à grandes fleurs mauves: *Dissotis barteri* Hook. f. et *D. thollonii* Cogn. ex Buett. var. *elliottii* (Gilg) Jac.-Fél. *Polyscias aequatoguineensis* Lejoly & Lisowski (Araliaceae) est une espèce récemment décrite qui n'est connue que des manteaux arbustifs du pied de 3 inselbergs de Guinée Equatoriale et du Nord du Gabon.

Les franges forestières abritent des *Garcinia* et *Rinorea* ainsi que de nombreuses épiphytes (Orchidaceae, Piperaceae, Aspleniaceae, Begoniaceae, ...). Nous avons récolté dans la frange forestière de Piedra Nzas *Podocarpus latifolius* (Thunb.) R.Br. ex Mirb. (Podocarpaceae), un arbre montagnard qui vit habituellement en Afrique tropicale à une altitude supérieure à 1500m. On peut émettre l'hypothèse que sa présence est un vestige de l'extension à plus basse altitude de la végétation montagnarde durant les périodes froides du Quaternaire.

Alen. Only a little patch of it can be found in Engong. This dry grass-land includes also *Gladiolus unguiculatus* Bak. (Iridaceae), *Polystachya odorata* Lindl. var. *trilepidis* Summerh. (Orchidaceae) and *Oreonesion testui* A. Raynal (Gentianaceae).

The mesoxeric and wet grass-lands are dominated by *Loudetiopsis glabrata* (K. Schum.) Conert (Poaceae), *Eragrostis invalida* Pilger (Poaceae), *Scleria spiciformis* Benth. and *S. aterrima* (Ridley) Napper (Cyperaceae), as well as two orchids, *Habenaria procera* (Sw.) Lindl. var. *gabonensis* (Rchb. f.) Geerinck and *Polystachya albescens* Ridl.

Bushy edges around the meadows are usually occupied by *Memecylon collinum* Jac.-Fél. (Melastomataceae) and *Psychotria peduncularis* (Salisb.) Steyerm. (Rubiaceae). But on some inselbergs, bushy Melastomataceae with great pink flowers ; *Dissotis barteri* Hook. f. and *D. thollonii* Cogn. ex Buett. var. *elliottii* (Gilg) Jac.-Fél. are the dominating species. *Polyscias aequatoguineensis* Lejoly & Lisowski (Araliaceae) is a recently discovered species, known only from 3 inselbergs of Equatorial Guinea and north Gabon. Forest edges are composed of several *Garcinia* (Clusiaceae) and *Rinorea* (Violaceae) as well as many epiphytes (Orchidaceae, Piperaceae, Aspleniaceae, Begoniaceae, ...). In the forest fringe of the Piedra Nzas inselberg a *Podocarpus latifolius* (Thunb.) R.Br. ex Mirb. (Podocarpaceae) was found. It is a mountain tree that usually lives above 1500m in tropical Africa. Its presence could be some vestige of the extension to lower altitudes of mountain vegetation during Quaternary cold periods.

O. PASCAL ¹, Jean-Noël LABAT ², Marc PIGNAL ²

[Poster - AREAS4]

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Diversité et origine de la flore de Mayotte

Depuis 1995 un inventaire intensif des plantes vasculaires de Mayotte, Archipel des Comores, est mené par le Muséum national d'Histoire naturelle et le Service de l'Environnement et de la Forêt de Mayotte. Une double approche méthodologique a été adoptée : inventaires quantitatifs des vestiges de forêts naturelles et inventaires qualitatifs de la flore essentiellement axés sur les arbres et les arbustes. Ce travail a considérablement augmenté le nombre de spécimens disponibles pour l'étude de la flore de l'île, connue presque uniquement par du matériel récolté au 19ème siècle.

Les nouvelles récoltes ont permis d'identifier de nombreuses espèces signalées pour la première fois à Mayotte et dans les Comores, certaines d'entre elles étant nouvelles pour la science. Ainsi on peut estimer qu'au moins 500 espèces de plantes vasculaires indigènes se rencontrent à Mayotte et que la flore vasculaire de l'ensemble de l'archipel des Comores est constituée d'environ 1500 espèces (au lieu de l'estimation antérieure de 935 espèces).

Le taux d'endémisme strict à Mayotte serait compris entre 5 et 10 % alors que 12 % des espèces ne se rencontrent pas en dehors de l'archipel des Comores. Ces valeurs relativement basses sont toutefois concordantes avec le fait que les Comores sont des îles volcaniques d'origine relativement récente et qu'elles sont localisées à proximité de deux grandes sources potentielles de végétaux, Madagascar et l'Afrique.

La flore présente des affinités malgaches très marquées et des affinités africaines plus faibles, cependant cette composition globale cache une hétérogénéité entre les différents types de végétation. Les forêts humides sont plus riches en espèces endémiques de Madagascar et/ou des Comores alors que les forêts sèches sont principalement composées d'espèces à vaste répartition régionale (Afrique, Madagascar, Seychelles et Mascareignes).

Alan PATON

The Herbarium, Royal Botanic Gardens, Kew, U.K.

[Lecture - SYST1]

***Plectranthus* (Labiatae) : generic delimitation and identification**

Plectranthus with 350 species as currently defines is a common and medicinally important genus in Tropical Africa. As currently delimited it is a paraphyletic group which is difficult to circumscribe and communicate. A new generic delimitation based on morphological and molecular data will be presented.

Luc PAUWELS

Jardin botanique national de Belgique, Meise, Belgique

[POSTER - FLOR2]

Les jardins botaniques de Eala et de Kisantu, cent ans d'existence

1. Le roi Léopold II fonda par décret du 3 février 1900 le Jardin Colonial de Laeken et le Jardin Botanique d'Eala. Un laboratoire de chimie à Tervuren devait exécuter des analyses sur du matériel colonial. Lors d'une prospection agronomique du Congo Indépendant (1895-96) le prof. E. Laurent avait préconisé l'installation de ce jardin sur l'équateur près de Mbandaka (ex-Coquilhatville).

Le premier directeur de ce jardin fut Mr. L. Pynaert. Le jardin de Laeken devait fonctionner comme relais dans l'introduction de nouvelles espèces. Un petit jardin d'introduction avait déjà fonctionné à Boma. En 1913 un célèbre botaniste, C. Vermoesen prit la direction pour un an. Un herbier fut constitué et un laboratoire de chimie installé. A. Corbisier-Balland prit la direction pendant quelques années. Ensuite, vers les années 1920 il y a V. Goossens comme directeur.

A partir de 1928 le jardin fut administré par la "Régie des Plantations de la Colonie" qui devint l'Institut National pour l'Etude Agronomique du Congo (INEAC). Les grandes cultures prirent alors la route pour Yangambi, qui devint le siège principal du nouvel institut. Là des collections botaniques vivantes furent faites en fonction de la rédaction de la Flore du Congo. Un grand herbier fut organisé. Les doubles furent envoyés au Jardin botanique national de Belgique. Citons parmi les directeurs congolais de Eala: Nsimundele, suivi de Kimbundu (1972-82).

2. En 1900 le frère J. Gillet quitta le plateau de Kisantu avec son potager trop petit et s'installa au bord de l'Inkisi, au lieu dit Yindu. La partie basse fut irriguée par le ruisseau Kungisi et la partie haute culminait vers une colline où il fit un calvaire.

Le frère Gillet était arrivé en 1893 avec la première équipe de missionnaires jésuites. Il vécut jusqu'en 1943. Sa succession fut assurée par le frère L. Gorissen en attendant que le père Callens soit prêt. Pendant cette transition, en 1944, Mr. R. Germain dressait le plan et l'emplacement des différentes espèces. Le père Callens, arrivé en 1947, faisait régulièrement des voyages de prospection botanique au Bas-Congo et au Kwango, où il a récolté un important herbier de plus de 5000 spécimens. Il eut des contacts avec plusieurs firmes pharmaceutiques auxquelles il livrait du matériel à examiner. Il fonda aussi l'école d'horticulture qui est

construite au milieu du jardin. En 1959 il quitta le Jardin et fut remplacé par le père de Laminne qui devait quitter l'école d'agriculture de Kimbau qu'il avait fondée.

En 1968 L. Pauwels vint le décharger de la gestion du jardin, mais il restait directeur de l'école. La période de 68 - 74 fut caractérisée par la récupération de la concession originale de 100 hectares. Vers les années 1970 la Présidence décida d'agrandir le Jardin jusqu'à 225 hectares, de clôturer le tout, d'asphalter une route jusqu'au centre du Jardin, de construire un restaurant. Pendant cette période le nombre de touristes devint très important. L. Pauwels continua de livrer du matériel pour des analyses chimiques à des professeurs de l'Université de Kinshasa et à des laboratoires en Belgique.

Dans les circonstances difficiles qui suivirent la zaïrénisation L. Pauwels donna sa démission. La Compagnie de Jésus décida alors de se séparer du Jardin. Il fut confié au Bureau de la Présidence et passa bientôt au Département de l'Environnement, de la Conservation de la Nature et du Tourisme; en 1978 un Institut des Parcs Zoologiques et Botaniques fut créé au sein de ce département.

Pendant la période de gestion par l'état le paiement des salaires devint très aléatoire et le personnel se découragea. Le premier directeur congolais fut Nsola, suivi de Nsimundele et de Kimbundu (depuis 1987). La situation financière ne permit plus d'entretenir convenablement le Jardin. Une aide de Kew (BGCI) permit de passer une période difficile. Les deux Jardins botaniques ont besoin d'une aide urgente pour sauver le patrimoine scientifique et pour développer ces instituts à un niveau international.

Les différents catalogues publiés donnent une idée de l'évolution des collections:

Kinds, Catalogue de Laeken (1911). Goossens, Catalogue d'Eala (1921, 1924). Gillet, Catalogue de Kisantu (1909, 1913, 1927). Pynaert, Catalogue de Laeken (1937). Pauwels, Catalogue de Kisantu (1972).

Luc PAUWELS

[Poster - FLOR4]

Jardin botanique national de Belgique, Meise, Belgique

Plantes exotiques, plantes cultivées, plantes agressives en Afrique centrale, suivant les données de l'herbier BR

1. *Chromolaena odorata* a été récolté pour la première fois au Congo-Kinshasa en 1975 et nous avons signalé sa présence en 1978 (Bull. Jard. Bot. Nat. Belg. 48: 435). Entretemps cette espèce est devenue très envahissante en Afrique Centrale et en Afrique de l'Ouest. Des congrès et des symposiums sont consacrés à la destruction de cette espèce gênante. A l'aide de quelques cartes de distribution dressées à des intervalles réguliers nous démontrerons l'expansion de cette espèce. Nous ferons de même pour d'autres espèces qui accidentellement ou par intention d'horticulteurs ont été introduites en Afrique Centrale: p. ex. *Tithonia diversifolia*, *Euphorbia heterophylla*, *Croton hirtus*, *Hyptis suaveolens* ...

2. Les plantes exotiques ne reçoivent pas toujours toute l'attention qu'elles méritent dans la rédaction des flures. Néanmoins, certaines prennent une place importante dans la végétation actuelle, fortement influencée par l'homme. Nous pensons à l'arbre *Bellucia pentamera*. Nous avons encodé au hasard, sans être complet, dans l'herbier de BR les plantes introduites et arrivons à plus de 220 espèces dont un spécimen d'herbier prouve sa présence en Afrique Centrale.

3. Plusieurs espèces de la flore locale sont cultivées comme légume, comme plante médicinale ou magique, ou servent d'arbre de palabres ou de limites de parcelle dans le milieu traditionnel.

Patrick S.M. PHIRI

[Lecture - AREAS2]

Department of Biological Sciences, School of Natural Sciences, The University of Zambia, Lusaka, Zambia

The diversity and habitat preferences of the miombo woodland dominant taxa in Zambia

The paper is being presented to offer a plausible explanation on factors leading to the distribution patterns displayed by the miombo woodland variants in Zambia. Long term studies are in progress aimed at the synthesis of a refined vegetation map that will provide data of predictive value to land-use management programmes. The Republic of Zambia, whose territory covers an area of 729,933 km², is located between the latitudes of 08°15'S and 18°05'S and between the longitudes of 22°00'E and 33°43'E. About 80% of the country lies on the central African plateau at a general elevation of 1000-1300 m above sea level. The miombo woodlands are the characteristic feature on the plateau region and on the Muchinga and Zambezi

escarpments. Prominent genera that define the miombo are the species of *Brachystegia*, *Isoberlinia* and *Julbernardia*. Studies have revealed that the country has a diversity of miombo woodland variants whose floristic composition embraces species of *Copaifera*, *Cryptosepalum*, *Erythrophleum*, *Guibourtia*, *Maquesia*, *Monotes*, *Parinari* and *Uapaca*. The woodland variants tend to exhibit a correlation with the nature of topography, geology, soil types and rainfall patterns. The genera belonging to the closely related fabaceous tribes of Amherstieae and Detarieae display habitat preferences that are broadly influenced by topography. Both tribes have their centre of origin located in the Guineo-Congolian region. In Africa most species of the amherstean genera generally occur on the continental plateau whereas species of the detariean genera show a preference for low altitude regions.

However, in Zambia species of *Brachystegia*, *Cryptosepalum*, *Isoberlinia* and *Julbernardia* are prominent on the plateau, with species of *Cryptosepalum* and *Isoberlinia* restricted to the high rainfall northern half of the country. Species of the detariean genera occur along the river valleys of the Luangwa and Zambezi and on the Kalahari sands in the western sector of the country. At species level the woodland taxa occur in specialised habitats in response to relief, edaphic conditions and annual precipitation. In the under-storey and ground-storey the annual plants are mobile and thus of little indicator value; but some perennials such as the woody species of *Anisophyllea*, *Copaifera*, *Dracaena*, *Monopetalanthus*, *Napoleona* are of indicator value with respect to the nature of soil types and climatic patterns. Thus the mapping of the miombo woodland variants will assume a much more refined form if the taxonomic relationship of the dominant taxa are taken into account.

Roger PIERLOT
Bruxelles, Belgique

[POSTER - FLOR4]

Herbier numérique par balayage in vivo
Résumé non reçu.

Digital herbarium by in vivo scanning
Abstract not received.

M. PIGNAL, J.-N. LABAT, C. CUSSET, H. FALAISE, F. RAKOTONDRAINIBE
MNHN, Laboratoire de Phanérogamie, Paris, France

[Lecture - FLOR4]

Les données informatisées sur la flore africaine et malgache à l'herbier de Paris

Historiquement, l'herbier de Paris constitue une des collections de référence incontournables pour la flore africaine et malgache. Le programme d'informatisation de ses collections a débuté en 1993 avec la mise en place de la base de données SONNERAT, basée sur les spécimens d'herbier, fonctionnant sur un modèle multitable relationnel développé sous ORACLE. Il a prioritairement été mené sur les collections africaines en raison de l'importance des travaux floristiques menés tant au laboratoire de Phanérogamie qu'à l'extérieur, avec l'objectif d'améliorer l'accessibilité et l'exploitation du corpus de données herbariologiques. Quatre approches différentes et complémentaires ont été menées pour évaluer le système mis en place :

- Saisie de l'ensemble des spécimens d'une famille importante nécessitant une réorganisation et une actualisation en tenant compte des publications disponibles sur le sujet : les Asteraceae d'Afrique continentale (environ 38.000 enregistrements).
- Suite à la révision des Leguminosae pour la flore de Madagascar et des Comores, informatisation de l'ensemble du matériel étudié (plus de 18.000 enregistrements).
- Saisie de la totalité des nouvelles récoltes réalisées par les chercheurs du Laboratoire lors des missions à Madagascar et aux Comores (plus de 2.000 enregistrements).
- Informatisation des prêts du matériel africain et malgache (environ 7.000 enregistrements).

Cette première étape a montré la faisabilité et l'intérêt d'une telle démarche. Près de 90.000 enregistrements sont actuellement disponibles sur internet (<http://www.mnhn.fr/base/sonnerat.html>) et peuvent être consultés selon plusieurs critères de sélection. L'accès par le WEB permet en particulier aux chercheurs de localiser et d'accéder aux données des types nomenclaturaux présents à P (18.000 spécimens types saisis).

Ces données sont également disponibles pour des études basées sur la chorologie des espèces, en particulier dans le domaine de la conservation et de l'étude de la biodiversité. Un premier traitement par un système GIS sera exposé lors de ce congrès pour Madagascar.

Vanessa PLANA

Royal Botanic Garden Edinburgh, Edinburgh, U.K.

[Lecture - SYST3]

Morphological and molecular systematics of the Afro-Madagascan fleshy-fruited *Begonia*

The Afro-Madagascan fleshy-fruited *Begonia* species are divided into four sections: *Baccabegonia*, *Tetraphila*, *Squamibegonia* and *Mezierea*. Together they comprise 40 species and are considered basal in *Begonia*. Recent cladistic studies at the Royal Botanic Garden Edinburgh, based on sequence data from the internal transcribed spacer region of nuclear ribosomal DNA (ITS), have shown that the principally Madagascan section *Mezierea* is paraphyletic.

In this study, sequence data from the chloroplast *trnL* intron and ITS, in addition to morphological data have been used to reconstruct the phylogeny of the fleshy-fruited African *Begonia* with the intention of studying character evolution and pinpointing morphological characters which can be useful for classification in *Begonia*. ITS shows high levels of both base substitutions and length mutations which frequently make alignment difficult. The utility of this region for these species is being investigated and an analysis will be presented. Variation in the non-coding *trnL* region is due mostly to length mutations with, for example, species in sections *Baccabegonia* and *Squamibegonia* sharing a 186 base-pair deletion. In a cladistic analysis, *trnL* sequence data were not sufficiently variable to resolve all relationships within this group, particularly within the section *Tetraphila*, however some well supported clades have become evident. *B. salaziensis* (sect. *Mezierea*) holds stronger affinities with the Madagascan winged-fruited *Begonia* than with other fleshy-fruited *Begonias*, making this section paraphyletic and corroborating earlier findings.

The section endemic to São Tomé *Baccabegonia* is sister to section *Squamibegonia* also from the Gulf of Guinea Islands and West Africa. Within section *Tetraphila* all the straight-styled species form a well supported clade, as do the species with triangular fruits and poricidal anther dehiscence.

Morphological characters such as stigma shape, indumentum type, fruit shape and anther dehiscence are being investigated for their taxonomic value. The classification of these sections of *Begonia* will be reassessed and their patterns of diversification and biogeographic significance discussed.

Gerald POPE

Royal Botanic Gardens, Kew, U.K.

[Poster - FLOR3]

Progress on Flora Zambesiaca

The poster will present an up-date on the status of this flora, providing details of which families have been published and those yet to be published, supported by relevant statistics on numbers of taxa and Flora volumes and parts.

Christina J. POTGIETER, Trevor J. EDWARDS

School of Botany & Zoology, University of Natal Pietermaritzburg, Scottsville, South Africa

[Poster - SYST1]

The significance of hybrids in South African species of *Plectranthus* (Lamiaceae)

The genus *Plectranthus* displays its greatest diversity in corolla form in South Africa. This has prompted the question of what has driven the evolution of corollas on the subcontinent. It seems probable that the derived corolla forms are the product of increasing levels of specialization which leads to more efficient pollen dissemination, but it is difficult to quantify such trends. Our pollination studies have however revealed a number of natural hybrids and these provide direct evidence of lower levels of pollinator fidelity. This paper covers the range of natural hybrids which have been recorded during our pollination study and correlates them to the degree of corolla specialization displayed by their parents.

Pollinator observations show that insect visitors do move between species of *Plectranthus* where they grow together. At Oribi Gorge, for example, the nemestrinid fly *Stenobasipteron wiedemanni* (proboscis length 22–29 mm) and the acrocerid fly *Psilodera confusa* (proboscis length 9–12 mm) were seen to move between flowers of *P. ciliatus* (corolla tube length 7 mm) and *P. zuluensis* (corolla tube length 12.5 mm). The flowers are designed to best fit the proboscis length of *Psilodera confusa*, but in the case of *P. zuluensis* the style and filaments are of a length approaching that of the proboscis of *Stenobasipteron wiedemanni*, which also allows for visits by and pollen deposition on this insect species. Not far from where these observations were made a

plant of a putative *P. cilatus* X *P. zuluensis* hybrid was found. Observations of insect visits to the flowers of this hybrid plant were made, but they did not result in any seed set. *Plectranthus* reproduces readily by vegetative means, which would explain how these plants are maintained in the system.

In order to gauge whether our predictions regarding parent species of a number of hybrids were accurate, a thin layer chromatography (TLC) technique was used to compare the essential oil profiles of hybrids and putative parent species. Hybrid plants generally show a combination of the profiles of both parents. Results from TLC and morphological observations are used to discuss the occurrence of hybrids in *Plectranthus*, and pollinator exclusion through elongated corolla tube length is proposed as a means of maintaining species integrity.

Christina J. POTGIETER, Trevor J. EDWARDS

[Poster - SYST2]

School of Botany & Zoology, University of Natal Pietermaritzburg, Scottsville, South Africa

The evolution of long, narrow corolla tubes in southern African Lamiaceae

Long, narrow corolla tubes have evolved several times in genera of southern African Lamiaceae, such as *Plectranthus*, *Thorncroftia*, *Orthosiphon*, *Hemizygia*, *Stachys* and *Salvia*. Other genera such as *Leonotis* (bird pollinated) and *Syncolostemon* (insect pollinated, but with a wide corolla throat) that also contain species with long tubes, will not be included in this discussion.

A study of the pollination of *Plectranthus* in KwaZulu-Natal and the Eastern Cape of South Africa showed a nemestrinid fly, *Stenobasipteron wiedemanni*, to be the pollinator of the four species that have long corolla tubes (*P. ambiguus*, *P. reflexus*, *P. hilliardiae* and certain varieties of *P. saccatus*). The proboscis length of this fly corresponds to that of the corolla tube lengths of the flowers (15-30 mm). It is postulated that *Stachys tubulosa* and *Salvia scabra* (tube lengths of 12-18 and 20-35 mm respectively) are also pollinated by this fly, as they both occur in forests in KwaZulu-Natal and the Eastern Cape and have similar mauve, lilac or purple flowers. This fly is restricted in distribution to forest patches along the eastern region of southern Africa. *Stachys thunbergii* from the southern Cape (George/Knysna area and Table Mountain) has a corolla tube of 16-20 mm and grows on forest margins. *Stenobasipteron wiedemanni* has not been recorded from this area, but other long-tongued fly pollinators have been documented and these may account for the corolla shape in this species.

In Mpumalanga long-tubed species that are closely allied to *Plectranthus* - *Orthosiphon tubiformis* (20-35 mm corolla tube), *Thorncroftia longiflora* (30-38 mm) and *Thorncroftia succulenta* - occur in relatively dry grassland habitats in cool mist-belt areas. *Salvia repens* var. *keiensis* is restricted to grassland and open woodland in the Eastern Cape and has a more narrow corolla tube than the bee-pollinated *Salvia repens* var. *repens*. The distribution of these species correspond in part to that of the nemestrinid fly *Prosoeca ganglbaueri* (proboscis length 16-34 mm) which is restricted in distribution to cool grassland habitats.

This paper aims to discuss the distribution of long-tubed members of the Lamiaceae in relation to that of long-tongued flies by relating the biogeography of the flies to that of the plant species.

Christian PUFF¹ & SILESHI Nemomissa²

[Lecture - AREAS3]

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² Addis Ababa University, Department of Biology, The National Herbarium, Addis Ababa, Ethiopia

The Simen Mountains (Ethiopia): comments on plant diversity, endemism, phytogeographical affinities and historical aspects

The Simen (also: Semien) Mountains are located in Gondar Admin. Region, in the North of Ethiopia. Ras Dejen (4543 m), the highest peak in the country, is part of the mountains. They include extensive high plateau areas (roughly 3200 to 4000 m) which are separated from the lower-lying parts (locally known as "Kolla" or "Simen lowlands"; ca. 2500 to below 2000 m) by steep escarpments. Three distinct vegetation zones, i.e., the afro-montane, ericaceous and afroalpine belt, can be distinguished. The first-mentioned is richest in species, whereas the afroalpine belt - although the most spectacular part of the mountains - is poorest. In general, species diversity decreases with increasing altitude. At present, over 500 taxa of angiosperms are recorded.

The mountains, a UN World Heritage site and the well known habitat of the endemic Walia Ibex (*Capra waliae*), also harbour some endemic plant species (e.g. *Rosularia semiensis*: afroalpine, or *Maytenus cortii*: afroalpine). Various taxa occurring in the Simen are Ethiopian endemics (e.g. the spectacular afroalpine *Lobelia rhynchtopetalum*, or *Saxifraga hederifolia*, or the afroalpine *Polyscias farinosa*, only known from the N & NW parts of the country). Interesting phytogeographical affinities to SW Arabia are noteworthy, e.g. *Dianthus longiglumis* (only known from the Simen and S Yemen), or *Chlorophytum tetraphyllum* (Ethiopian mountains and Yemen). Numerous taxa, both from the afroalpine and -alpine zone, show a distribution stretching from the Simen southwards to the tropical E African mountains (e.g. *Psychotria orophila*, afroalpine, or *Trifolium cryptopodium*, afroalpine). Others (primarily taxa occurring in the afroalpine zone of the Simen) show wide distribution ranges (e.g. *Phoenix reclinata*, to W and S Africa).

The Simen is a historic plant collecting locality, and – according to our present state of knowledge – type collections of over 80 afroalpine and -alpine elements originate from the region (primarily by W.G. Schimper in the past century). In past few decades, however, plant collecting was largely impossible (socio-political problems in the North of the country!), so that the botanical knowledge of the Simen was much poorer than for the rest of the country. Only in recent years, botanical exploration restarted. It is thus not surprising that during expeditions carried out between 1996 and 1999 ten new records (afroalpine elements, otherwise being widely distributed) could be made.

France RAKOTONDRAINIBE

[Lecture - AREAS4]

Muséum d'Histoire Naturelle, Laboratoire de Phanérogamie, Paris, France

Distribution nord-sud de la diversité des Ptéridophytes dans les forêts naturelles des hauts plateaux de Madagascar

La diversité des Ptéridophytes est étudiée dans six aires protégées des hauts plateaux de Madagascar situées sur un axe nord-sud : le Parc National (PN) du Marojejy, la Réserve Spéciale (RS) d'Anjanaharibe-Sud, la RS d'Ambositantely, le PN d'Andohahelo, la RS d'Ivohibe et le PS d'Andohahelo. La richesse spécifique et le taux d'endémisme sont évalués pour chaque site à partir des listes floristiques globales. Les indices de diversité moyens sont calculés sur des parcelles échantillons de 800 m² réparties, dans chaque réserve, le long d'un gradient altitudinal. Ces données ainsi que les cartes de distribution d'espèces à aire restreinte sont discutées en vue d'évaluer la part des facteurs climatiques et des effets de la fragmentation du massif forestier initial des hautes terres malgaches sur le modèle de répartition nord-sud des Ptéridophytes.

Sylvain G. RAZAFIMANDIMISON¹ & Birgitta BREMER²

[Lecture - SYST3]

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² University of Uppsala, Sweden

Tribal and subtribal delimitation in the tribe Naucleaeae (Rubiaceae): inferences from molecular and morphological data

ITS sequences of rDNA and morphological data were combined and analyzed cladistically using both parsimony and maximum likelihood methods in order to propose robust tribal and generic limits for the tribe Naucleaeae. The Naucleaeae *sensu lato* are mostly paleotropical (Asia, Africa, and Madagascar). Only two widespread genera, *Cephalanthus* and *Uncaria*, occur in the Neotropics.

Bertholletia, *Nauclea*, *Ochromolaena*, and *Sarcocaulis* (subtribe Naucleinae *sensu* Ridsdale), and *Neolamarckia* (subtribe Neolamarckinae *sensu* Ridsdale) constitute a strongly well-supported monophyletic group defined by having spindle-shaped or fusiform stigmatic lobes. The subtribe Adimninae *sensu* Ridsdale is not a clade. The genera *Halleria* and *Mitrasacme* form another well-supported clade with a very high bootstrap value. The separation of the Afro-Asian genus *Mitrasacme* and the African genus *Halleria* as distinct genera is strongly supported by our analyses. *Uncaria* is not closely related to *Mitrasacme* and *Halleria* as many authors postulated based on morphological characters such as numerous, imbricately ascending ovules attached to the placenta. The members of the tribe Cynantheraceae *sensu* Andersson (*Cynanthera*, *Crossopteryx*, *Halleria*, *Hymenodictyon*, *Mitrasacme*, and *Uncaria*) included in the analyses were scattered and nested within the members of the Naucleaeae *sensu* Ridsdale. *Crossopteryx* is sister to the rest of the ingroup. *Luculia* and

Mussaendopsis fell outside of the rest of the ingroup. From the perspective of phylogenetic systematics, the current subtribal delimitation of the Naucleaeae *sensu* Ridsdale and the Coptosapelteae *sensu* Andersson is untenable and must be disregarded. The African Naucleaeae (including Madagascar) is now comprised of *Nauclea* (including *Sarcocephalus*), *Hymenodictyon*, *Burttidavya*, *Corynanthe*, *Breonadia*, *Breonia*, and *Gyrostipula*.

L.P. RONSE DE CRAENE¹ & H.P. LINDER²

[Poster - SYST2]

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Relationships of Melianthaceae : evidence of floral ontogeny and anatomy

A comparative study of the floral ontogeny and anatomy of two species of *Melianthus* and one species of *Bersama* is made using LM and SEM. Flowers are weakly to strongly monosymmetric, as reflected in the initiation sequence. Sepal initiation runs in two times with the anterior sepals behaving as a unit. The development of monosymmetry in the family can be observed as a stepwise process, linked with displacements of organ primordia and selective losses. Similarities and differences between the two genera are shown to be related to this process. In *Melianthus* an abaxial petal primordium is initiated but it aborts at a certain stage of development; in *Bersama* all petals are present but the incipient zygomorphy is visible at the onset of initiation. In *Melianthus* and *Bersama* four stamens are the rule, but flowers pentamerous in all whorls are occasionally found. The solitary ovule per carpel in *Bersama* is derived from a condition with two rows by the failure of one row to initiate. Our data support a relationship of Melianthaceae with Greyiaceae and Francoaceae, concomitant with macromolecular results.

Sophie RUELLE¹, Mark FENN & François MALAISSE²

[Lecture - AREAS4]

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Plant species diversity of Didiereaceae dry forest in Southern Madagascar

Separated from Continental Africa by Mozambique Channel some 165 millions years ago, the island of Madagascar represents a micro-continent according to its area, climates and geology. The dry forest vegetation units of the south and south-west of the island, though tremendous, were only the subject of a few biological inventories. In the Androy Region (South), a phytosociological survey was carried out inside two dry forest in the vicinity Tolagnaro. The data analysis allowed us to have a better approach of species diversity of those poorly known forest ecosystems, both rich in archaic and endemic species. On the other hand, the study of the distinguished facies allows to pinpoint the importance of abiotic features on phytocenosis composition and distribution.

Diversité spécifique végétale de la forêt sèche à Didiereaceae du sud de Madagascar

Séparée de l'Afrique continentale par le Canal de Mozambique il y a quelque 165 millions d'années, l'île de Madagascar constitue un véritable micro-continent en raison de sa superficie, de ses climats et de sa géologie. Les formations forestières sèches du sud et sud-ouest de l'île, bien que remarquables, n'ont fait l'objet que de quelques inventaires biologiques. Dans la région de l'Androy (Sud), une étude phytosociologique a été menée sur deux forêts denses sèches des environs de Tolagnaro. L'analyse des informations récoltées nous a permis de mieux cibler la diversité spécifique de ces écosystèmes forestiers méconnus, à la fois très riches en espèces archaïques et dotés d'un taux d'endémisme remarquable. D'autre part, l'étude des faciès reconnus permet de dégager l'importance des facteurs abiotiques sur la composition et la répartition de la phytocénose.

Sophie RUELLE¹ & François MALAISSE²

[Poster - AREAS4]

¹ Faculté Universitaire des Sciences Agronomiques, Laboratoire d'Ecologie, Gembloux, Belgique² Jardin botanique national de Belgique, Meise, Belgique**From vertical profile to macrotransect : contribution of the structure in a Malagasy dry forest**

In Southern Malagasy Region, more exactly at Ambosoar, we have carried out a one kilometer transect with the intention of describing the vegetation aspect of the Ankodida dry forest. Structural survey of this vegetation allows us to specify its structure and constituents arrangement. The transect direction was perpendicular to contour lines. On both sides of this axis, 50 x 20 m plots are delimited and we used these to define vegetation facies with vertical and horizontal projections. These projections were useful to determine elevation zones of the vegetation.

Du profil vertical au macrotransect : apport de la structure dans une forêt dense sèche malgache

Dans la région australe de Madagascar, plus exactement dans la zone d'Ambosoar sud, nous avons réalisé un transect d'un kilomètre de long permettant de mettre en évidence la structure végétale de la forêt dense sèche du site d'Ankodida. L'étude de la structure de cette formation végétale consiste à définir la manière dont elle est construite ainsi que l'agencement de ses constituants. Le tracé du transect s'est effectué selon un axe perpendiculaire aux courbes de niveau. De part et d'autre de cet axe, des parcelles de 50 x 20 m sont délimitées et furent l'outil qui nous a permis de définir la structure végétale selon des projections verticale et horizontale. Ces projections nous ont éclairés sur la zonation altitudinale de la végétation.

Olof RYDING

[Poster - VAR1]

Botanical Museum, Copenhagen, Denmark

What is the biological importance of myxospermy and myxocarpy?

The following hypotheses have been put forward to explain the biological value of myxospermy/myxocarpy (the condition of seeds and dry indehiscent fruits to form mucilage when they become wet): 1) that the mucilage anchors the diaspores; 2) that it serves as a water reservoir for the germinating seeds; 3) that it protects the seeds against premature germination by serving as an oxygen barrier; 4) that it serves as an aid to dispersal. In order to evaluate some of these hypotheses, data on presence and strength of the mucilaginous reaction has been compared to some other characteristics and conditions of the same species. The statistical survey is based on 400 species of Lamiaceae subfam. Nepetoideae (of which c. 115 come from tropical Africa), in this subfamily the character of presence or absence of myxocarpy is very homoplastic (variable within many groups or closely related species). The result shows that: 1) Tropical Africa has a higher percentage of myxocarpic species than other phytogeographical regions. 2) Species that grow in dry habitats are more often myxocarpic and tend to show a stronger mucilaginous reaction than those that grow in moist or wet habitats. 3) Species with small nutlets are more often myxocarpic than species with large nutlets. However, large nutlets that are mucilaginous, do usually show a stronger reaction. 4) Annuals are more often myxocarpic than perennials. 5) Species with a reticulate or overall hairy nutlet surface are not myxocarpic. The result as a whole, and particularly that of the latter three comparisons, may be taken as a support for the hypothesis that the most important function of myxocarpy/myxospermy is to serve as an aid to dispersal of the diaspores.

Michel SCHAUES¹ & François MALAISSE²

[Poster - SYST4]

¹ Grez-Doiceau, Belgique² Jardin botanique national de Belgique, Meise, Belgique**Orchidées critiques du Haut-Katanga (République Démocratique du Congo)**

Résumé non reçu.

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[Lecture - AREAS4]

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Taxonomy, chorology and conservation status of species in Madagascar's endemic plant families

Madagascar's eight endemic plant families (Asteropeiaceae, Didymelaceae, Didiereaceae, Kaliphoraceae, Melanophyllaceae, Physenaceae, Sarcolaenaceae, and Sphaerosepalaceae) comprise 19 genera and ca. 95 species. These taxa are truly the "most endemic of the endemics" among the island's remarkably rich flora, and are of exceptional conservation importance. However, the lack of a reliable taxonomy for many of the genera, and insufficient knowledge of the distribution, ecology and conservation status of most species precludes making sound recommendations for their protection. A collaborative project begun in 1998 that integrates taxonomy, chorology, and conservation aims to remedy this situation, and will result in the publication of a Red Data Book in which each species will be evaluated and classified according to IUCN's "risk of extinction" categories. As a necessary prerequisite for chorological analyses and the assessment of conservation status, a reevaluation of the existing taxonomy in each family has been conducted, resulting in a series of synoptic revisions that recognize nearly twenty new species and substantially alter former circumscriptions.

Comprehensive data entry and post facto geo-referencing of all herbarium collections has then facilitated GIS-based chorological analyses with respect to protected areas, bioclimatic zones, geological substrates, and vegetation types. Additional field studies carried out by Malagasy students have focused on species that appear to be conservation priorities, i.e., those that have restricted ranges or are currently not known from protected areas. Combined chorological analyses of all species in the endemic families have revealed numerous centers of endemism, among which several sectors of the humid Eastern littoral forest on sand, as well as subhumid sclerophyllous woodland on granite, quartzite and marble outcrops in the Ibity and Itremo Massifs of the Central High Plateau, are currently not included in the Protected Areas system. Such a "gap analysis" becomes a powerful tool for determining conservation priorities and the most appropriate sites for new protected areas.

R.J. SEBOLA & K. BALKWILL

[Poster - SYST1]

C.E. Moss Herbarium, Department of Animal, Plant and Environmental Sciences, University of the Witwatersrand, WITS, South Africa

Morphological variation in populations of *Olinia rochetiana* (Oliniaceae) in South Africa

Past taxonomic treatments of *Olinia* in southern Africa highlighted the paucity of knowledge regarding the nature and extent of morphological among the populations of *O. rochetiana* A. Juss. In South Africa, populations of *Olinia* occurring in Mpumalanga and Northern Province have at one referred to *O. usamberensis* and later as part of the *O. rochetiana* without regards to previous workers. The results of both cluster analyses and PCA support splitting the populations into two distinct morphological forms: one form recognised by thick coriaceous leaves, reddish margins and the deep red inflorescence axes, peduncles, pedicels and hypanthia, from which the other form differs by slightly thin and papery leaves, margin colour same as the entire lamina, and the inflorescence axes, peduncles, pedicels and hypanthia being light green to creamy white. The differences in floral features are known to reliably distinguish between species in *Olinia*, and in this case the differences in floral features are correlated with differences in vegetative features. The two forms are described and their habitats and distributions discussed.

Bruno SENTERRE

[Poster - AREAS1]

Laboratoire de Botanique systématique et de Phytosociologie, Université Libre de Bruxelles, Belgique

Situation phytogéographique de la forêt dense de la région de Nsork (Guinée Equatoriale)

La région des Altos de Nsork (1° 14' N; 11° 01' E), dans l'Est de la Guinée Equatoriale, se caractérise par un relief très vallonné, constitué de collines juxtaposées faisant varier l'altitude entre 500 et 700

Phytogeographical position of the Nsork rain forest (Equatorial Guinea)

The Altos de Nsork region (1° 14' N; 11° 01' E), in the east part of Equatorial Guinea, is characterised by its undulating relief, resulting of hills juxtaposition, and by the proximity of the Gabon central range. The

m, et par l'influence marquée de la chaîne centrale du Gabon. Cette forêt, jusqu'alors méconnue, a fait l'objet d'une étude basée sur six transects de 1 km de long et un transect de 700 m de long, au sein desquels tous les ligneux à DBH ≥ 30 cm (Diameter at Breast Height : 1.30 m) ont été répertoriés sur une largeur de 50 m, soit 3886 ligneux sur 33.5 ha. Notre étude s'inscrit dans un programme plus vaste, le CUREF (Conservación y Utilización Racional de los Ecosistemas Forestales de Guinea Ecuatorial), ayant déjà encadré deux travaux similaires : l'un dans l'estuaire du Rio Muni (Sud-Ouest de la Guinée Equatoriale) et l'autre dans la réserve de Ndote (Centre-Ouest de la Guinée Equatoriale). Ces deux inventaires se composent chacun de six transects de 1 km de long sur 50 m de large pour les ligneux à DBH ≥ 30 cm.

Afin de tenir compte des différents types forestiers rencontrés, un tableau phytosociologique a été réalisé en utilisant le logiciel Twinspan version 3.10. Les ligneux à DBH ≥ 10 cm ont alors été relevés sur 20 parcelles de 160 x 10 m, choisies en zones homogènes : huit parcelles proviennent de l'inventaire de Nsork, six de celui de Ndote et six autres de celui de l'estuaire du Rio Muni, soit un total de 1,28 ha.

La prise en considération des trois inventaires guinéens cités ci-dessus a permis de préciser l'évolution des types forestiers selon le gradient de continentalité ouest-est. Notre synthèse de ces trois études a considéré 9970 ligneux à DBH ≥ 30 cm, appartenant à 341 espèces déterminées au moins jusqu'au genre, relevés sur une superficie de 93,5 ha. La comparaison de la densité des espèces dans les trois sites a permis de mettre en évidence les espèces à distribution typiquement littorale : *Desbordesia glaucescens*, *Calpocalyx heitzii*, *Alstonia congensis*, *Sacoglottis gabonensis*, *Anthostema aubryanum*, *Erythrophleum ivorense*, *Caloncoba glauca*, *Lophira alata*, *Croton oligandrus*.

D'autre part, certaines espèces montrent une distribution plus continentale, déjà reconnue dans la littérature pour plusieurs d'entre elles : *Millettia laurentii*, *Sindoropsis letestui*, *Entandrophragma congoense*, *Celtis tessmannii*, *Dialium pachyphyllum*, *Dialium* spp., *Allanblackia* sp., ... L'abondance de telles espèces dans la forêt dense de Nsork, et d'espèces dites générales du domaine bas-guinéen atlantique comme *Aucoumea klaineana*, nous permet de conclure que cette forêt se situe à l'extrémité continentale de ce domaine phytogéographique. En outre, deux espèces rares ont

altitude varies continuously from 500 to 700 m. This little known forest has been studied using six 1 km long transects and one 700 m long transect where all trees of DBH ≥ 30 cm (Diameter at Breast Height : 1.30 m) were examined over a 50 m width, thus 3886 trees over 33.5 ha. Our work is part of a larger project, the Curef (Conservación y Utilización Racional de los Ecosistemas Forestales de Guinea Ecuatorial), already responsible of two other similar works: the first one in the Rio Muni's estuary (south-west of Equatorial Guinea) and the second in the Ndote reserve (center-west of Equatorial Guinea). These two inventories have studied both six 1 km long transects over a wide of 50 m for the trees with DBH ≥ 30 cm.

In order to take the different kinds of forest that were observed into account, a phytosociological table was realised using the Twinspan version 3.10 program. The trees with DBH ≥ 10 cm were then inventoried over twenty surveys of 160 x 10 m, chosen in homogeneous parts of transect: eight surveys came from the Nsork inventory, six from the Ndote one and six from the Rio Muni's estuary one, covering a total area of 1.28 ha.

The consideration of the three guinean inventories mentioned above allowed the description of the forest's evolution along the continental west-east gradient. Our synthesis of these three studies considered 9970 trees with DBH ≥ 30 cm, belonging to 341 species determined at least at the genera level, found on 93.5 ha. The comparison of the species density over the three regions pointed to the importance of the species with a typically littoral distribution: *Desbordesia glaucescens*, *Calpocalyx heitzii*, *Alstonia congensis*, *Sacoglottis gabonensis*, *Anthostema aubryanum*, *Erythrophleum ivorense*, *Caloncoba glauca*, *Lophira alata*, *Croton oligandrus*.

Similarly, some species have a more continental distribution, already mentioned in publications for some of them: *Millettia laurentii*, *Sindoropsis letestui*, *Entandrophragma congoense*, *Celtis tessmannii*, *Dialium pachyphyllum*, *Dialium* spp., *Allanblackia* sp., ... The abundance of this kind of species in the Nsork rain forest, and the abundance of some species characteristic of the lower-guinean atlantic region as *Aucoumea klaineana*, allow us to conclude that this forest belongs to the most continental part of this phytogeographical region. Besides, two rare species were identified for the first time in Equatorial Guinea (*Engomegoma gordonii*

été identifiées pour la première fois en Guinée Equatoriale (*Engomegoma gordonii* et *Stachyothyrsus staudtii*) et caractérisent la forêt dense de terre ferme particulière de la région de Nsork.

Enfin, les forêts de l'estuaire du Rio Muni présentent une forte biodiversité du fait de leur situation intermédiaire entre la zone littorale et la zone centrale du domaine bas-guinéen atlantique. On y trouve des forêts sur sols hydromorphes proches de celle étudiée à Nsork aux abords du Rio Abang (caractérisées par *Uapaca guineensis*, *Scyphocephalum ochocoa*, *Staudtia kamerunensis*, *Pycnanthus angolensis*, *Plagiostyles africana*, *Petersianthus macrocarpus*, *Pentaclethra eetveldeana*, *Fagara heitzii*, ...), des forêts typiques de la zone littorale, similaires à la forêt de Ndote, et des forêts intermédiaires entre la zone littorale et la zone centrale.

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La diversité des ligneux dans la forêt de Nsork (Guinée Equatoriale)

La forêt dense humide de la région de Nsork se trouve à 150 km à l'Est de Bata, dans la partie continentale de la Guinée Equatoriale. Cette région présente des caractéristiques remarquables telles que son relief de collines (l'altitude variant entre 500 et 700 m) et sa proximité de la chaîne centrale du Gabon. Ce massif forestier étant le deuxième en terme de superficie pour la Guinée Equatoriale, une zone de 70 000 ha a dès lors été délimitée par le projet CUREF (Conservación y Utilización Racional de los Ecosistemas Forestales de Guinea Ecuatorial) qui propose de lui attribuer le statut de « Parc National des Altos de Nsork ». La zone concernée par la présente étude se trouve dans l'Ouest de cette région, à 1 km à l'Est du Rio Abang (1° 14' N ; 11° 01' E).

Au sein de sept transects totalisant 6,7 km de longueur, 3886 ligneux à DBH \geq 30 cm (appartenant à 226 espèces) ont été répertoriés sur une largeur de 50 m (soit 33,5 ha) tandis que, pour les DBH \geq 10 cm, 689 ligneux appartenant à 149 espèces figurent sur 8 tronçons de 160 m de long sur 10 m de large (soit 1,28 ha).

La comparaison de ces deux types d'inventaires avec d'autres inventaires similaires réalisés en Afrique centrale a montré une biodiversité

and *Stachyothyrsus staudtii*) and are characteristic of the special mainland rain forest of Nsork.

Finally, the forests of the Rio Muni's estuary show a huge biodiversity because of their intermediate situation between the littoral and the central zones of the lower-guinean atlantic region. There are some forests on hydromorphic soils very similar to these studied at Nsork nearly the Rio Abang (characterised by *Uapaca guineensis*, *Scyphocephalum ochocoa*, *Staudtia kamerunensis*, *Pycnanthus angolensis*, *Plagiostyles africana*, *Petersianthus macrocarpus*, *Pentaclethra eetveldeana*, *Fagara heitzii*, ...), some forests typical of the littoral zone, very similar to these of Ndote, and some forests of transition between the littoral and the central zones.

[Poster - AREAS1]

Diversity of trees in the Nsork rain forest (Equatorial Guinea)

The Nsork rain forest is located at 150 km East of Bata, in the continental region of Equatorial Guinea. This region has remarkable characteristics: namely, its undulating relief (the altitude running from 500 to 700 m) and its proximity of the Gabon central range. This forest massif being the second in terms of surface for Equatorial Guinea, a 70000 ha area has been delimited by the CUREF project (Conservación y Utilización Racional de los Ecosistemas Forestales de Guinea Ecuatorial) who suggest to attribute to it the "Altos de Nsork National Park" status. The area concerned by this study is located in the west part of this region, at 1 km east of rio Abang (1° 14' N ; 11° 01' E).

Within the 6.7 km of transects, 3886 trees with DBH \geq 30 cm (belonging to 226 species) were inventoried on 50 m width (33.5 ha) and those with DBH \geq 10 cm (689 trees belonging to 149 species) on eight sections of 160 x 10 m (1.28 ha).

The comparison of these two different kinds of inventories with other similar inventories made in central Africa showed a quite important biodiversity (displayed by the graphs "area-number of species"). This comparison also allowed us to display the characteristic species *Engomegoma gordonii* (3.2

relativement importante (mise en évidence par l'examen des courbes "aire-espèces cumulées").

Cette même comparaison nous a permis de mettre en évidence les espèces caractéristiques *Engomegoma gordonii* (3,2 pieds / ha pour les DBH ≥ 30 cm ; Olacaceae) et *Stachyothyrsus staudtii* (1,8 ; Caesalpiniaceae), ainsi que des espèces préférentielles à la région de Nsork telles que *Coula edulis* (4.4), *Sindoropsis letestui* (1.1), *Dialium pachyphyllum* (1.4), *Allanblackia* spp. (3.9), *Dacryodes buettneri* (1.9), ...

La forêt étudiée est très largement dominée par les Burseraceae et les Olacaceae. Parmi les 74 espèces d'émergents (DBH ≥ 70 cm), les principales espèces en terme d'abondance sont *Aucoumea klaineana* (3,1 pieds / ha pour les DBH ≥ 70 cm), *Scyphocephalum mannii* (= *S. ochocoa*) (1), *Engomegoma gordonii* (0,6), *Coula edulis* (0,5), *Pterocarpus soyauxii* (0,3), *Sindoropsis letestui* (0,2), *Pentaclethra macrophylla* (0,2) et *Monopetalanthus letestui* (0,2). Par ailleurs, la strate arborescente inférieure (DBH ≥ 10 cm) a pu être caractérisée par les espèces propres à cette strate (en excluant la régénération des espèces des strates supérieures) présentant les plus grandes valeurs d'abondance : *Santiria trimera* (61 pieds / ha pour les DBH ≥ 10 cm), *Microdesmis puberula* (= *M. zenkeri*) (45), *Heisteria parvifolia* (37), *Dichostemma glaucescens* (20) et *Centroplacus glaucinus* (9).

Enfin, notons que la comparaison des courbes "effectif d'échantillonnage-espèces cumulées" tracées pour les trois catégories de DBH (≥ 10 cm, ≥ 30 cm et ≥ 70 cm) nous a amenés à émettre l'hypothèse d'une diversité plus importante dans les strates inférieures.

stems / ha for the trees with DBH ≥ 30 cm ; Olacaceae) and *Stachyothyrsus staudtii* (1.8 ; Caesalpiniaceae), and also the preferential species of the Nsork region as *Coula edulis* (4.4), *Sindoropsis letestui* (1.1), *Dialium pachyphyllum* (1.4), *Allanblackia* spp. (3.9), *Dacryodes buettneri* (1.9), ...

The Nsork rain forest is clearly dominated by the Burseraceae and the Olacaceae. Among the 74 emergent species (DBH ≥ 70 cm), the most abundant are: *Aucoumea klaineana* (3.1 stems / ha for the DBH ≥ 70 cm), *Scyphocephalum mannii* (= *S. ochocoa*) (1), *Engomegoma gordonii* (0.6), *Coula edulis* (0.5), *Pterocarpus soyauxii* (0.3), *Sindoropsis letestui* (0.2), *Pentaclethra macrophylla* (0.2) and *Monopetalanthus letestui* (0.2). On the other hand, the forest lower stratum (DBH ≥ 10 cm) has been characterized with its own densest species (excluding the regeneration of the forest upper stratum species): *Santiria trimera* (61 stems / ha for the DBH ≥ 10 cm), *Microdesmis puberula* (= *M. zenkeri*) (45), *Heisteria parvifolia* (37), *Dichostemma glaucescens* (20) and *Centroplacus glaucinus* (9).

Finally, the comparison of the graphs "sampling effort-species number", drawn for the three classes of DBH (≥ 10 cm, ≥ 30 cm and ≥ 70 cm) leads us to hypothesize that the biodiversity is more important in the forest lower levels.

G. SIBOE

University of Nairobi, Department of Botany, Nairobi, Kenya

Function of fungi in orchid conservation

Abstract not received.

[Lecture - SYST4]

S. SIMIYU

The Plant Conservation Programme, East African Herbarium, Nairobi, Kenya

A plant information service for Eastern Africa

At the XVth International Botanical Congress held in St. Louis Missouri in August, 1999, botanists of the World noted that as many as two-thirds of the world's 300,000 plant species are in danger of extinction in nature during the course of the 21st century (Raven 1999). As a result a series of resolutions were passed to galvanise into action a concerted effort in plant conservation and research.

No doubt, some of these plants may be lost before we know what they are, their use or biology. Though often confounded by lack of sufficient funds, most biodiversity rich countries however have various initiatives

[Poster - FLOR4]

to mitigate this process. However, the inability to access relevant information on status conservation and expertise for relevant taxa is a constraint in implementing strategic yet effective local and regional programmes. Researchers are also not able to access relevant resources to facilitate collaborations and linkages efficiently.

Earlier, in 1996, a study on the Plant Resources of Eastern Africa (Activities and source of information) was undertaken by the "Observatoire du Sahara et du Sahel" and IUCN. Of the regional recommendations, a specific recommendation stated that "efforts must be made not only to publicise the existence of information pertaining to Eastern Africa Plant Resources, but also to ensure that it is available to interested individuals and institutions located in the region." Also stressed as a means to enhance our capacity were the need for increased collaboration, sharing of information and expertise and training.

It is in this context that an electronic, plant information service for Eastern Africa available on the Web has been initiated. The objective of this service is to provide information to researchers and conservationists on the plants of the region and their status in the wild as well on going research.

A preliminary status of database generated and proposed as well as network prospects presented. This project is being undertaken under the aegis of the Eastern Africa Plant Specialist Group, a recently established IUCN-SSC Group, with support from National Museums of Kenya-East African Herbarium and the IUCN Eastern African Regional Office.

S. SIMIYU

[Poster - VAR1]

The Plant Conservation Programme, East African Herbarium, Nairobi, Kenya

Networking to enhance research and conservation: The IUCN-SSC Eastern Africa Plant Specialist Group - Objectives and aims

Abstract not received.

S. SIMIYU

[Poster - VAR1]

The Plant Conservation Programme, East African Herbarium, Nairobi, Kenya

The Global Plant Conservation Initiative

Abstract not received.

D. SIMPSON¹, C.A. FURNESS¹, T. HODKINSON² & M.W. CHASE¹

[Lecture - SYST3]

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Phylogeny of Cyperaceae tribe Hypolytreae

Cyperaceae tribe Hypolytreae comprises eight genera (*Capitularina*, *Diplasia*, *Exocarya*, *Hypolytrum*, *Mapania*, *Paramapania*, *Principina* and *Scirpodendron*). Tribe Chrysitricheae (*Chrysitrix*, *Chorizandra* and *Lepironia*) has sometimes been included within the circumscription of Hypolytreae. The genus *Hellmuthia* has also been included in both Hypolytreae and Chrysitricheae although recent molecular work has demonstrated a placement away from these tribes. In Africa and the Mascareignes, *Hypolytrum*, *Mapania* and *Principina* (Hypolytreae) are present, together with *Chrysitrix* and *Lepironia* (Chrysitricheae). *Hypolytrum* and *Mapania* are widespread in the humid forested regions of west and central Africa and the Mascareignes while *Chrysitrix* is present in damp, lowland areas of South Africa. *Lepironia* is confined swampy areas of Madagascar, and *Principina* is a little-known genus endemic to Principe. The status and position of tribe Hypolytreae has long been problematic. Some authors have considered the group to be primitive within Cyperaceae while others have regarded it as highly specialised. These difficulties are compounded by the uncertain interpretation of several morphological features, in particular the 'spicoid'-type partial inflorescence which occurs only in Hypolytreae and Chrysitricheae. Initial molecular studies using the chloroplast gene *rbcL* showed that Hypolytreae and Chrysitricheae form a monophyletic group sister to the rest of Cyperaceae, supporting the view that Hypolytreae exhibits plesiomorphic characteristics within the family. The present study focuses on a combined morphological and molecular phylogeny (the latter using non-coding regions

from cpDNA (trnL-F and rps16) and nrDNA (ITS)), together with an investigation of pollen development. This work confirms the group's placement within Cyperaceae and demonstrates a close relationship with tribe Chrysitricheae. In the pollen development of most Cyperaceae only one meiotic nucleus survives, forming pear shaped pseudomonads with indistinct apertures, as in *Chrysitrix*, *Lepironia* and *Hellmuthia*. *Hypolytrum* and *Mapania* have spheroidal grains with one distinct aperture (ulcus) and examination using transmission electron microscopy shows that *Mapania* grains are different ultrastructurally to those of most other Cyperaceae.

Yashica SINGH¹ & Himansu BAUNATH²

[Poster - SYST1]

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Species diversity in southern African *Hypoxis* (Hypoxidaceae)

Hypoxis L. comprises almost 90 species, distributed in Africa, Asia, the Americas and Australia. The largest number of species (c. 45) occurs in southern Africa with the centre of diversity for the genus being the eastern region of South Africa. The genus is well-defined within the family by its dense pubescence and yellow flowers with free perigone segments. However, clear diagnostic characters for separating species within *Hypoxis* are lacking, consequently species are notoriously difficult to identify. The occurrence of interspecific hybridisation between morphologically distinct taxa such as *H. obtusa* Burch. ex Edwards and *H. rigidula* Baker further obscures identification, as the hybrids are not identifiable with either parents.

The potential use of African *Hypoxis* in medicine, particularly as an immunity booster for cancer and AIDS patients, has increased the demand for a taxonomic account of the genus. An investigation of characters in southern African species of *Hypoxis*, has shown that many of the diagnostic attributes are poorly defined and overlap considerably. This hinders the application of correct names. For example, many herbarium specimens of diverse morphology are being identified as *H. acuminata* Baker due to the lack of suitable keys and complete descriptions.

Except for differences in size and number, flowers in most species of *Hypoxis* are similar and are of slight diagnostic value. In contrast, leaf characters are more useful in species demarcation. These characters include shape, dimensions, texture, trichomes and venation. On the basis of morphology, the southern African species of *Hypoxis* may be roughly placed into seven groups: *H. parvula* group, *H. angustifolia* group, *H. filiformis* group, *H. argentea* group, *H. hemerocallidea* (*H. rooperi*) group, *H. colchicifolia* group and *H. rigidula* group. Leaf trichome characters have been used by earlier workers in the group to delimit *Hypoxis* species. Our SEM studies confirmed that attributes such as distribution, type, density and orientation of trichomes are useful in separating particular species or groups of species in *Hypoxis*. However, the use of these characters are limiting since more than one trichome type occurs in many of the species.

This poster highlights morphological characters of diagnostic importance to the southern African species of *Hypoxis*. It further clarifies species groups, provides an understanding to the relationship of species and addresses taxonomic difficulties within the genus. The resolution of taxonomic problems within *Hypoxis* demands collaboration by scientists from the different continents.

B. SINSIN

[Lecture - AREAS2]

Facultés des Sc. Agron., Université Nationale du Bénin, Cotonou, Bénin

Formes de vie et diversité spécifique des herbacées des forêts claires du Nord-Bénin

Résumé non reçu.

G. F. SMITH¹, B-E. VAN WYK², E.M.A. STEYN¹ & I. BREUER³

[Poster - SYST1]

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Classification of *Haworthia*: perspectives from nectar sugar analysis and morphology

Opinions on species and genus concepts and infrafamilial delimitations in the Aloaceae (subfamily Alooideae of the Asphodelaceae) have often been controversial. The basic integrity of the three principal genera, *Aloe*, *Haworthia* and *Gasteria*, is usually accepted, but the infrageneric classification of the taxonomically difficult genus *Haworthia* as well as the legitimacy and intergeneric relationships of *Astroloba*, *Chortolirion*, *Lomatophyllum* and *Poellnitzia* has frequently been debated. Arguments are mostly based on evidence obtained from vegetative and floral morphology, but data from other fields, e.g. *in vitro* callus growth, cytogenetics and phytochemistry, have also been used for speculating on taxonomic affinities within the Aloaceae. In a previous study based on sugar analyses of nectar we could distinguish three nectar types that corresponded with distinct suprageneric groups in the family. Although the sugar composition (relative proportions of sucrose, glucose and fructose only) was remarkably consistent within each of the aforementioned genera, one of many representatives of the large subg. *Haworthia* differed remarkably from the rest. This aberration suggested that a more rigorous comparison of the sugar composition of nectar in species of *Haworthia* might reveal some substantiation for recognising infrageneric groups in this genus and possibly help to elucidate relationships with the closely allied genera *Astroloba* and *Chortolirion*. For the present study, nectar from representatives of the last-mentioned two genera, the three subgenera of *Haworthia* and from interspecific haworthioid hybrids and miscellaneous taxa was sampled on filter paper. Nectar was recovered from the papers and analysed by isocratic HPLC operating at 2.5 ml min⁻¹. A refractive index detector was used for detection. The presence of fructose, glucose and sucrose was determined as a percentage of total sugars, using peak height and 8 mg ml⁻¹ of each sugar as external standard. Two nectar types were distinguished in *Haworthia* and the two related genera: a *Haworthia* type (subg. *Haworthia* only, usually less than 50% sucrose) and a *Hexangulares* type (subg. *Hexangulares*, subg. *Robustipedunculares*, *Chortolirion* and *Astroloba*, usually more than 60% sucrose). We evaluated our findings in the light of current views on the infrafamilial classification of the Aloaceae.

Paul P. SMITH

[Lecture - AREAS2]

The Herbarium, Royal Botanic Gardens, Kew, U.K.

Chipya in Zambia: floristics, soils and definition

The word 'chipya' is derived from the Bemba verb 'kupya' meaning 'to burn', the noun referring to a 'burnt place'. Trapnell first introduced the term to the scientific literature in his pioneering ecological survey of Zambia, where he specifically applied the word to areas of wooded grassland dominated by fire-resistant woody species, tall grass and a characteristically luxuriant herbaceous layer defined by the key indicator species *Aframomum albioviolaceum*, *Smilax anceps* and *Pteridium aquilinum*. Trapnell also observed that chipya was often associated with relict patches of dry evergreen forest, and this factor together with the herbaceous floristic indicators led him to postulate that chipya occurs over areas formerly covered by evergreen forest and since degraded by fire. Trapnell's theory of chipya's evergreen origins has received support from a number of authors and Lawton has suggested a regression sequence of mateshe (evergreen forest) → herb/grassland → chipya, driven by fire and/or cultivation. In his original study, Trapnell also noted that chipya soils, particularly those of the lake basins, were characterised by a dark humic layer in their upper horizon, a factor he related to the luxuriant herbaceous layer present in chipya.

Lawton has since challenged the nature of the chipya humic horizon, the uniqueness of chipya soils, and the floristic integrity of chipya itself. Using data from nearly 400 vegetation-soil plots in north-eastern Zambia, he found it floristically impossible to categorise many of the plots into miombo, chipya or mateshe, encountering what he described as a continuum, with most plots intermediate between two or more vegetation types. He also found no significant differences between chipya and miombo soils, although no experimental evidence was published regarding this assertion. As a result of his findings, Lawton has proposed that a chipya-miombo-mateshe succession may occur, in reduced fire conditions.

Based on experimental evidence from Zambia's Kasanka National Park, this paper attempts to answer some of these key questions raised in chipya ecology. Can mateshe, chipya and miombo vegetation types be clearly defined floristically and edaphically, and if so, how do these factors relate to mateshe-chipya-miombo dynamics?

N. SOKPON, A. YAYI, N. BIAOU & P. TRÈKPO

[Lecture - AREAS2]

Faculté des Sciences Agronomiques, Université Nationale du Bénin, Cotonou, Bénin

Structure et dynamique de la forêt claire à *Isoberlinia* au Nord du Bénin

Les forêts claires à *Isoberlinia* forment une large bande quasiment continue depuis le Mali jusqu'à l'Ouganda suivant un gradient de pluviosité annuelle supérieur à 900 mm. Au Bénin, elles se situent entre le 8° et le 11° latitude Nord et représentent près des 2/3 des formations de la zone soudanienne. Elles ont été étudiées sur la base de relevés phytosociologiques exécutés dans des placeaux rectangulaires de 1000 m².

La richesse en ligneux de ces forêts varie de 47 à 101 espèces. La densité des arbres (dbh > 10 cm) varie de 338 à 549 tiges/ha en fonction de la pluviométrie et du gradient latitudinal. Aussi la surface terrière de ces forêts varie de 14 à 34 m²/ha. La régénération naturelle des espèces des forêts à *Isoberlinia* varie de 304 à 1384 brins/ha dont près de 80% de semis naturels d'*Isoberlinia*.

B. SONKÉ¹, L. ZAPFACK² & C. DONMEZA¹

[Poster - VAR1]

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² Faculté des Sciences, Université de Yaoundé, Yaoundé, Cameroun

Flore et distribution des épiphytes sur les haies vives dans la région de Bafou (Cameroun)

Une étude de la flore et de la distribution des épiphytes sur les haies vives a été faite dans la région de Bafou (monts Bamboutos, Cameroun).

Cette étude vise à examiner la composition et la diversité des épiphytes rencontrées sur les haies vives. Un inventaire sur 836 pieds de 13 espèces-soutiens nous a permis de dénombrer 77 espèces d'épiphytes. Les Monocotylédones sont représentées par 28 espèces; les Dicotylédones par 25 espèces et les Ptéridophytes par 14 espèces. Les familles les plus représentées sont les Orchidaceae (41,8 %), les Polypodiaceae et les Compositae avec chacune 11,9 % d'espèces. *Cola anomala* (Sterculiaceae) est le phorophyte le plus riche en épiphytes, en effet 44 espèces des 77 présentes ont été signalées sur l'ensemble des individus de cette espèce.

Brita STEDJE

[Poster - SYST2]

Botanical Garden and Museum, University of Oslo, Oslo, Norway

Generic delimitation within Hyacinthaceae

Abstract not received.

Tariq STEVART & Daniel GEERINCK

[Poster - SYST4]

Laboratoire de Botanique systématique et de Phytosociologie, Université Libre de Bruxelles, Belgique

Diversité des Orchidaceae à São Tomé et Príncipe

Les Orchidaceae de São Tomé et Príncipe sont étudiées dans le cadre d'un projet régional d'étude des orchidées et des inselbergs qui couvre São Tomé et Príncipe, le Gabon, la Guinée Equatoriale et le Cameroun. Il est le fruit d'une collaboration entre le Laboratoire de Botanique systématique et de Phytosociologie de l'Université libre de Bruxelles, le Programme de Conservation et d'Utilisation Rationnelle des Écosystèmes Forestiers en Afrique

Diversity of Saotomean and Principean orchids

The orchids of São Tomé and Príncipe were studied as part of a regional orchids and inselbergs study project which spread on São Tomé and Príncipe, Gabon, Equatorial Guinea and Cameroon. This project stems from the collaboration between the "Laboratoire de Botanique systématique et de Phytosociologie de l'Université libre de Bruxelles," the "Programme de Conservation et d'Utilisation Rationnelle des Écosystèmes Forestiers en Afrique

Centrale (Ecofac) et l'Institut de Recherche en Ecologie Tropicale (IRET).

Prolongement de la chaîne volcanique camerounaise dans le Golfe de Guinée, São Tomé est situé à 255 km de la côte du Gabon et est traversé par l'équateur; cette île a une superficie de 836 km² et culmine à 2024 m. Principe est situé à 150 km au nord-est de São Tomé, à 220 km de la côte de Rio Muni; sa superficie est de 128 km² et son point culminant n'est que de 948 m.

Peu de récoltes récentes existaient depuis celles recensées par Exell entre 1944 et 1973 et améliorées par la Croix en 1996. L'archipel possède pourtant une remarquable richesse spécifique en Orchidaceae; un taxon sur six appartient en effet à cette famille. Lorsque débuta notre travail, on signalait sur ces îles 88 taxons d'Orchidaceae. Actuellement, nous avons déterminé au rang spécifique et infraspécifique quelques 123 taxons. Parmi ceux-ci, neuf sont nouveaux pour la science. On totalise ainsi 31 cas d'endémisme sur les deux îles, ce qui représente un taux d'endémisme de 25%.

Les inventaires réalisés durant deux années ont permis de mettre en culture quelque 1507 échantillons d'orchidées dans deux ombrières construites dans un jardin botanique à Bom Sucesso. Nous avons utilisé cette collection pour faire un examen phénologique et morphologique approfondi. D'autre part, ces échantillons pourront attirer l'attention des touristes sur l'intérêt que représente la diversité végétale de l'archipel. Dans cette optique – promouvoir le développement touristique – le programme Ecofac a commandité un guide sur les orchidées de l'archipel (Stévant 2000).

Les premiers résultats de cette étude sont :

- A São Tomé, la distribution des orchidées dépend essentiellement, en basse altitude (moins de 800 m), de la quantité de précipitations et de l'anthropisation du milieu tandis qu'en haute altitude, ce sont l'humidité relative de l'air et l'ensoleillement qui sont les facteurs dominants.
- A Principe, vu la déforestation datant du début de ce siècle et une altitude moins importante, l'étude des facteurs responsables de la distribution des orchidées doit encore être perfectionnée, d'autant plus que bien des sites sont encore totalement inaccessibles.
- L'étude de l'affinité des Orchidaceae de l'archipel présente la chaîne volcanique Camerounaise comme axe de migration prédominant, mais il est fort probable que l'importance de celle-ci ait varié au cours du temps.

Centrale (Ecofac)" and the "Institut de Recherche en Ecologie Tropicale (IRET)".

Situated in the Guinea Gulf, São Tomé belongs to the Cameroonian volcanic range. Covering 836 square kilometres, it is located 255 km from the coast of Gabon and it is crossed by the Equator line. Its highest peak is 2024 meters high. Principe, 128 square kilometres and 948 meters of higher altitude, is located 150 kilometres north east of São Tomé and 220 kilometres from the coast of Rio Muni.

The archipelago has a high specific richness: one of six autochthonous taxa belongs to orchids family. Few information on orchids were available since those registered in the works of Exell between 1944 and 1973, reviewed in 1996 by la Croix. At the beginning of this study, 88 taxa of orchids were known in the archipelago. At present time, 123 taxa are known, among which nine are new. Thirty-one taxa in both islands are endemic; the endemic level is therefore around 25%.

Since 1997, we have collected 1507 samples of orchids. They are cultivated in a shade greenhouse in Bom Sucesso botanical garden. We use this collection to make a phenological and morphological study. On the other hand, these orchids samples will illustrate the botanical diversity of the archipelago to the tourist. In this line of thought, Ecofac has sponsored an orchids guide (Stévant 2000).

The first results of this study are:

- In São Tomé, the lower altitude orchids distribution depends on rainfall and human influence on the vegetation cover; in the higher altitudes, the main factors are the air relative humidity and the variation of sun intensity.
- In Principe, when considering the lower altitude as compared to São Tomé and the fact that the forest was destroyed in the beginning of the century, the study of the distribution factors needs to be improved. Furthermore, many investigation sites are still inaccessible.
- The study of the archipelago orchids affinity show that the Cameroonian range is the most important way of migration, but this way has probably changed in the past.

Terry C.H. SUNDERLAND

[Poster - SYST2]

African Rattan Research Programme, Herbarium, Royal Botanic Gardens, Kew, U.K.

A monograph of the African Rattans (Palmae: Calamoideae)

Rattans are climbing palms in the subfamily Calamoideae that are a characteristic component of the humid tropical forests of the Old World. The flexible stems of these palms are used for furniture production and basketry and contribute to a growing commercial trade worth some US\$ 6.5 billion per annum (ITTO 1997). Although, in terms of diversity, rattan palms are predominantly concentrated in the forests of SE Asia, some 18 species, representing four genera, occur in the forests of Africa. These include the endemic genera *Laccosperma*, *Eremospatha* and *Oncocalamus* which possess a unique morphology amongst the Calamoideae in that they climb with the aid of a cirrus that is a marked extension between the distal leaflets. These leaflets are present as reduced reflexed thorn-like organs termed acanthophylls. A further taxon, *Calamus deirratius*, a single, highly variable representative of an otherwise Asian genus, is also widespread in Africa. Throughout the forest zones of Africa, rattans are widely used, forming the basis of a thriving cottage industry and play a major role in indigenous subsistence strategies. Until recently, very little was known about the African rattan resource, despite calls by a plethora of government and conservation agencies calling for their promotion and development in order that they might meaningfully contribute to the global trade in rattan cane and cane products.

Such development, however, can only take place with the appropriate baseline biological, ecological and socio-economic information being available. Since its inception in 1996, the African Rattan Research Programme, a multi-disciplinary initiative of the Royal Botanic Gardens, Kew and University College, London, has undertaken extensive surveys throughout West and Central Africa leading to a recent taxonomic revision of the African rattan taxa. This revision is underpinned by a thorough review and comparison of indigenous classification systems, and an understanding of the ethnobotanical importance of each species. Further work as part of this programme has also led to the development of improved inventory techniques and the promotion of sustainable harvesting of wild populations. In addition, the establishment of a rattan arboretum at the Limbe Botanic Garden has enabled the establishment of preliminary silvicultural and agroforestry trials and a greater understanding of the socio-economic nature of the rattan trade in Africa has led to the initial development and promotion of improved processing and marketing techniques for artisans, harnessing expertise from SE Asia. The provision of this essential baseline information now makes the future sustainable development of the African rattan resource a coherent reality.

J.-J. SYMOENS & B. SYMOENS-PIQUERAY

[Poster - SYST1]

Laboratorium voor Algemene Plantkunde en Natuurbeheer, Vrije Universiteit Brussel, Belgique

Le cas épineux des *Trapa* tropicaux à deux épines – The difficult case of the 2-spined tropical *Trapas*

La taxonomie du genre *Trapa* est très controversée. Certains auteurs le considèrent comme ne comportant dans la nature actuelle qu'une seule espèce très variable, *Trapa natans* L. D'autres y reconnaissent de nombreuses espèces (environ 75 décrites jusqu'à ce jour, en particulier en Europe de l'Est et en Asie). La taxonomie du genre est largement basée sur le fruit qui porte généralement soit 2 soit 4 épines. Dans les régions tropicales et orientales d'Asie, ainsi qu'en Afrique tropicale ont ainsi été décrits plusieurs taxons à 2 épines, les principaux de ceux-ci étant, par ordre d'ancienneté:

Trapa bicornis Osbeck (1757, Chine)*Trapa cochinchinensis* Loureiro (1790, Viet-Nam)*Trapa bispinosa* Roxburgh (1815, Inde)

La forme typique de *T. bicornis* se distingue des deux autres par des fruits très robustes, de (5 -) 6,5 à 10 cm de largeur totale, à rapport largeur totale / hauteur de (2,2 -) 2,7-3,2, à cornes fortement réfléchies.

La distinction entre *T. cochinchinensis* et *T. bispinosa* (le plus proche des populations africaines à 2 épines) est moins franche et plusieurs auteurs les réunissent explicitement ou implicitement en un seul taxon, considéré tantôt comme variété de *T. bicornis* (*T. bicornis* var. *cochinchinensis* selon van Steenis) tantôt comme variété de *T. natans* (*T. natans* var. *bispinosa* selon Makino). L'éventuelle identité taxonomique des populations de *Trapa* à 2 épines d'Indochine, d'Inde et d'Afrique tropicale et la subordination de cet ensemble à *T. natans* sont à vérifier de façon critique. Une analyse en composantes principales (PCA) des données morphologiques

et une étude des isoenzymes et de l'ADN sont en cours afin d'évaluer le degré de parenté et de divergence de populations de *Trapa* d'origines diverses.

A cette fin, les auteurs font appel aux collègues et institutions qui pourraient leur faire parvenir des échantillons d'herbier (avec fruits) et des plantes vivantes de *Trapa* des régions tropicales (en particulier d'Afrique) et d'Extrême-Orient.

Joachim THIEDE¹, Bruno MIES², Fritz E. BEYHL³, Jan Just BOS⁴, Aguedo MARRERO⁵, Rafael S. ALMEIDA⁶
& Norbert JÜRGENS¹ [Poster - SYST3]

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² Institute for Ecophysiological Plant Ecology, University of Düsseldorf, Düsseldorf, Germany

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⁶ Universidad de Las Palmas de Gran Canaria, Sección de Geografía, Las Palmas de Gran Canaria, Canary Islands, Spain

The evolutionary position of the "dragon trees" within the Dracaenaceae: evidence from non-coding chloroplast DNA sequence data

Monophyly and evolutionary position of the Dracaenaceae relative to the Convallariaceae s.l. (= Convallariaceae s. str., Ruscaceae, Nolinaceae, and Eriospemaceae),

Monophyly and evolutionary position of the "dragon trees" within the Dracaenaceae,

Monophyly and evolutionary position of the (former) genus *Sansevieria* relative to *Dracaena*,

Correlation of morphological with molecular data and evolutionary trends within the Dracaenaceae,

Implications of the molecular data for the interpretation of the disjunct pattern in the "dragon trees".

Joachim THIEDE & Norbert JÜRGENS

[Poster - SYST3]

Botanical Institute, University of Cologne, Cologne, Germany

Molecular phylogenetics of the Aizoaceae

The family Aizoaceae (Hartmann 1993) comprises five subfamilies: the Sesuvioideae, Tetragonioideae, Aizooideae, and the two subfamilies informally subsumed as 'Mesembryanthema' (= the former family Mesembryanthemaceae): Mesembryanthemoideae and Ruschioideae. The widespread Sesuvioideae, Tetragonioideae and Aizooideae together comprise 12 genera with about 175 species only, whereas the "Mesembryanthema" (especially the Ruschioideae) mainly distributed in the southern African arid regions include the bulk of genera (ca. 115) and species (ca. 2300).

Based on sequence variation of the non-coding internal transcribed spacers (ITS 1 and 2) of the nuclear ribosomal DNA, the molecular phylogenetics of the Aizoaceae is studied. In particular, the impact of the molecular data for the following topics is addressed:

Monophyly and evolutionary position of the Aizoaceae within the Caryophyllales,

Macro-classification of the Aizoaceae s.l. (i.e., Aizoaceae s.l. vs. Mesembryanthemaceae / Aizoaceae s. str., as well as subfamilial classification),

Impact of the phylogenetic data for the understanding of relationships within the "Mesembryanthema", i.e., do the molecular data coincide with previous assumptions about relationships ?,

Impact of the phylogenetic data for the interpretation of the evolutionary history of the

"Mesembryanthema" (e.g., evolution of adaptive features such as growth forms and epidermal features),

Impact of populational studies (in *Aspazoma amplexens*) for the understanding of populational differentiation and genetic exchange within and among populations.

A. THIOMBIANO
Ouagadougou, Burkina Faso

[Poster - SYST2]

Combretaceae

Résumé non reçu.

D.I. THOMPSON, T.J. EDWARDS, J. VAN STADEN

[Poster - SYST4]

Research Centre for Plant Growth and Development, School of Botany and Zoology, University of Natal Pietermaritzburg, Scottsville, South Africa

***Disa* seed testa : a function of habitat and a determinant of germinability**

The majority of *Disa* Bergius species, as with temperate terrestrial orchids the world-over, are difficult to maintain in cultivation and *ex situ* seed germination is consistently poor. Within South Africa the 120+ species of *Disa* are restricted to different rainfall-dominated regions, viz. the south western (winter rain), south-eastern (summer rain) and eastern (summer rain) grasslands. *In vitro* seed culture of twenty species within the genus reveals a general decrease in seed germinability as one moves north-eastwards from the winter (1-2 months to germination) to the summer-rainfall (> 6 months) habitats. Intermediate germination (2-6 months) is recorded for those species occurring in both regions. Species showing similar germination patterns are usually taxonomically related, and occur within the same phytogeographical boundaries. Several aspects of *Disa* seed are currently under investigation as possible determinants of this trend. Analyses of lipid, protein and free sugar nutrient reserves within the proembryo are incomplete.

In an effort to enhance the success of seed culture as a means of promoting species conservation, the authors highlight the seed testa as a possible regulatory factor in *Disa* seed germination. A prominent feature of the mature dry seed is the variable colour of the testa integuments, attributable to species-specific levels of phenolic compounds within the testa. Total phenolic content (determined using the Folin-Denis method) correlates positively with ease of germinability, and by inference, with species distribution. Sterilizing solutions such as calcium and sodium hypochlorite enhance germination in certain *Disa* species, presumably by degrading the testa and enhancing permeability to water. Similarly liquid seed cultures and culture media containing activated charcoal decrease the time taken to, and often result in elevated levels of germination. Culture of immature seed (before phenolic deposition / browning has occurred) also hastens germination. Scanning electron microscopy has highlighted differences between species regarding basic seed size, seed type and testa cell arrangement, whilst transmission electron microscopy has aided our understanding of testa micro-morphology. All features of the testa, and its influence on basic plant biology and seed germinability are explained as adaptations to a particular suite of environmental conditions, allowing some speculation on the possibility of coat imposed seed dormancy, and its distribution within the genus *Disa*.

D.I. THOMPSON, T.J. EDWARDS, J. VAN STADEN

[Lecture - SYST4]

Research Centre for Plant Growth and Development, School of Botany and Zoology, University of Natal Pietermaritzburg, Scottsville, South Africa

Explaining patterns of germination in the South African *Disa* : where to look?

Ninety percent of southern Africa's 450 orchid species are terrestrials, with one-quarter of these belonging to the genus *Disa* Bergius. *Disa* consists of five subgenera and fifteen sections which reflect fairly homogenous phytogeographical entities. Within South Africa *Disa* is restricted to the rainfall-dominated south western (winter rain), south-eastern (summer rain) and eastern (summer rain) grasslands. Continuing destruction of this habitat through urbanization and agro-forestry threatens most species in the genus with population fragmentation and eventual extinction. Compounding the conservation issue, the majority of *Disa*'s, as with temperate terrestrial orchids the world-over, are difficult to germinate *ex situ* and maintain in cultivation. In an effort to promote the success of seed culture, propagation and conservation, we describe preliminary findings regarding patterns of germination for twenty South African *Disa* species. Of these, seven are winter rainfall endemics and ten are restricted to summer rainfall localities. Only four of the 120+ *Disa* species occur under both rainfall regimes, of which three are reviewed here.

Results reveal a decrease in seed germinability as one moves north-eastwards from the winter (1-2 months to germination) to the summer-rainfall (> 6 months) habitats. Intermediate germination (2-6 months) is recorded for those three species occurring in both regions. Species showing similar germination patterns are more often than not taxonomically related, and occur within the same phytogeographical region. Seed micro-morphology and chemistry are providing valuable insight into the links between taxonomy, phytogeography, seed morphology, symbiotic ecology and germinability. A series of newly formulated hypotheses warrant testing before the germination of *Disa* can be predicted, manipulated and ultimately achieved.

Jonathan TIMBERLAKE
Bulawayo, Zimbabwe

[Lecture - AREAS2]

Species diversity of vegetation types on northern Zimbabwe

Species diversity indices of a range of vegetation types in northern Zimbabwe, ranging from miombo and mopane woodland to grassland, are presented. The importance for species-based conservation is discussed.

B. TOUTAIN, Ph. DAGET & P. POILECOT
Cirad-EMVT, Montpellier, France

[Poster - FLOR3]

Degrés de représentativité pour les pays d'Afrique de l'ouest de flores par pays. Exemple des Poacées à partir des ouvrages existants

La publication d'une flore se limitant aux frontières d'un pays pose la question de sa validité pour une utilisation dans les pays voisins. La parution récente de deux flores des Poacées pour deux pays d'Afrique de l'ouest, la Côte d'Ivoire et le Niger, est l'occasion de vérifier dans quelle mesure celles-ci peuvent concerner d'autres pays de la région. On s'appuie pour cette comparaison sur les autres flores existantes, les catalogues par pays et les listes floristiques disponibles en Afrique de l'ouest et dans les pays du voisinage immédiat. Des groupes de pays doivent-ils se fédérer pour produire des ouvrages de plus grande portée ?

TRAORE Dossahoua, DA Kouhété Philippe, ETIEN Dibié Théodore, KOUAME N'Guessan François & TRA BI Fezan Honora

[Poster - VAR1]

Université de Cocody / UFR Biosciences, Laboratoire de Botanique, Abidjan, Côte d'Ivoire

Notion d'espèces rares, d'espèces en voie de disparition

Objectifs. L'espèce qu'on n'a pas retrouvée sur un site, doit-elle être considérée comme rare, comme disparue? Il s'agit de contribuer à la discussion sur la richesse floristique de la Côte d'Ivoire.

Méthodes. Un cas vécu et l'exploitation de résultats récents, sur le terrain vont enrichir notre argumentation.

Résultats. En 1976, *Sphagnum* sp. (Bryophytes) a été récolté dans une forêt marécageuse à l'Est d'Abidjan. En 1978, la plante n'a pu être retrouvée sur le même site, la forêt ayant été détruite. Présentement, on ne sait pas où vit cette Mousse, en Côte d'Ivoire. Doit-on la considérer comme disparue du pays ?

Au niveau du phytoplancton ivoirien, Da (1992 et 1997), malgré le concours d'algologues émérites tels que Couté et Compère, traîne 103 spécimens dont 79 sont seulement déterminés jusqu'au genre et 24 espèces présentant des formes sur lesquelles des doutes subsistent.

Dans la forêt classée du Haut Sassandra, Tra Bi (1997) et Kouame (1998) ont confectionné des herbiers vérifiés par Aké Assi, systématicien de renommée mondiale. Malgré tout, ils se retrouvent avec 6 espèces à détermination incertaine et 89 échantillons déterminés seulement jusqu'au niveau du genre.

Par ailleurs, nous avons découvert, abondants, dans cette forêt, et déterminés par Aké Assi, *Aptandra zenkeri* Engl. (Olacaceae), *Hibiscus comoensis* A. Chev. ex Hutch. et Dalz. (Malvaceae) et *Notobuxus acuminata* (Gilg.) Hutch. (Buxaceae), énumérés en 1988, par cet éminent botaniste, comme rares et en voie de disparition de la flore de la Côte d'Ivoire.

Conclusions. L'exploration botanique de la Côte d'Ivoire, commencée en 1892, par Pobeguine, selon Aké Assi (1963), se poursuit et est, à notre avis, loin d'être terminée, car :

- Champignons et Bryophytes n'ont pratiquement pas encore été pris en compte;
- de nombreux spécimens de plantes ne sont que partiellement déterminés;
- divers biotopes n'ont reçu, jusqu'ici, la visite d'aucun botaniste;
- les relevés de surface, sollicités de plus en plus, permettent de découvrir l'espèce cachée;
- à la faveur du changement climatique, de la transhumance des troupeaux de bovins, des échanges internationaux, l'enrichissement floristique de la Côte d'Ivoire se poursuit.

Par conséquent, les notions d'espèces rares et en voie de disparition doivent être utilisées avec réserve, pour les pays insuffisamment explorés.

Constant VANDEN BERGHE

[Poster - FLOR3]

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Etat d'avancement de la Flore Illustrée du Sénégal

Au cours des années 1970, Jean Berhaut a rédigé les six premiers volumes de la Flore Illustrée du Sénégal. Ces ouvrages étaient consacrés à la description des familles botaniques suivantes: Acanthacées à Avicenniacees (Tome I, 1971), Balanophoracées à Composées (Tome II, 1974), Connaracées à Euphorbiacées (Tome III, 1975), Ficoidées à Légumineuses (Tome IV, 1975), Légumineuses Papilionacées (Tome V, 1976) et Linacées à Nymphéacées (Tome VI, 1979).

A sa mort, la rédaction de la *Flore Illustrée du Sénégal* fut confiée à C. Vanden Berghen par le Ministère du Développement rural et de l'Hydraulique du Gouvernement sénégalais. Le Tome X consacré aux Monocotylédones (Pandacées à Zingibéracées) et aux Ptéridophytes a été composé mais n'a jamais pu être imprimé, alors que les Tomes VII (Dicotylédones, Ochnacées à Rubiacées), VIII (Dicotylédones, Rutacées à Zygophyllacées) et IX (Monocotylédones, Agavacées à Orchidacées) sont restés à l'état de manuscrits.

Est actuellement en préparation, la rédaction d'une "Nouvelle Flore Illustrée du Sénégal et des territoires voisins (notamment la Gambie et la Guinée-Bissau)". Le Volume 1 (à l'état de manuscrit) reprend une Introduction, un traitement des Cryptogames vasculaires et d'une partie des Dicotylédones (Aizoacées à Asclépiadacées) alors que le Volume 2 (en cours d'élaboration) traite une partie des Dicotylédones (Asteracées et familles dont le nom commence par la lettre B).

Renaat VAN ROMPAEY

[Lecture - PHYTO2]

ECOSYN project, Wageningen University, Wageningen, The Netherlands

Megatransects in Upper Guinea: how forest inventory data can be processed into a gradient map

The AETFAT Unesco vegetation map of Africa (White 1983) depicts the forest gradient within the Upper Guinea subcentre of the Guineo-Congolian 'rainforest' centre of endemism in a very concise way: 2 types and their mosaic on the map, and 4 types in the memoir. To map with more detail national vegetation maps exists but there is no straightforward technique to join their legends. A new approach was developed to map the gradient in the rainforests of Upper Guinea.

I therefore compiled all forest inventory data (50 timber species in 300 forest areas) from Upper Guinea countries and extracted the main gradient from the coast to the forest-savanna boundary using detrended correspondence analysis. The geographical analysis of its first axis showed a contour map describing the continuous variation in large tree species composition. The vegetation table functions as a legend translating a score along the gradient back to species composition with an indication of abundance. There is no need to designate diagnostic or typical species nor to name the types after dominant or frequent species. The contour lines join places of equal forest composition and are not boundaries between 'types'. They are drawn at equal intervals of compositional change, which is not the case for forest type maps.

It is concluded that (sub)continental vegetation maps should contain both sharp (satellite imagery based) boundaries of distinct vegetation types as contours depicting gradual compositional change within types. For the latter systematic floristic inventories are still needed for many countries.

L. VAN ZYL & E.M. MARAIS

[Poster - PHYTO1]

University of Stellenbosch, Dept. of Botany, Matieland, South Africa

The phytogeography of *Zygophyllum* (Zygophyllaceae) in southern Africa

Zygophyllum is confined to the desert and semi-desert areas of southern Africa. The centre of diversity for the genus is in the Karoo centre. The centre of diversity for the subgenus *Agrophyllum* coincides with this, but the centre of diversity for the subgenus *Zygophyllum* is in the Little Karoo (Montagu area). A discussion of the distribution of the genus within the different biomes of southern Africa is given.

L. VAN ZYL & E.M. MARAIS

[Poster - SYST1]

University of Stellenbosch, Dept. of Botany, Matieland, South Africa

A systematic revision of *Zygophyllum* (Zygophyllaceae) in southern Africa

Zygophyllum is divided into two subgenera with regard to the dehiscence of the fruit. Several other morphological characters confirm this division. Morphological characters used for the delimitation of the sections within *Zygophyllum*, as well as characters used for the delimitation of the different species are discussed.

J.-F. VILLIERS, F. BADRE, C. CUSSET & J.-J. FLORET

[Poster - FLOR3]

Muséum National d'Histoire Naturelle, Laboratoire de Phanérogamie, Paris, France

Flores d'Afrique et de Madagascar (publiées par le Muséum de Paris et l'Herbier National Camerounais)

Le Laboratoire de Phanérogamie du Muséum National d'Histoire Naturelle de Paris s'est, depuis le début du siècle, attaché à étudier les flores africaine et malgache. Dès 1936, H. Humbert mit en oeuvre l'élaboration de la *Flore de Madagascar et des Comores*. Il fut suivi par A. Aubréville qui y ajouta la *Flore du Gabon* en 1961 et celle du Cameroun en 1963; cette dernière est publiée par le Cameroun depuis 1980, le Muséum en assurant la rédaction et la co-responsabilité scientifique.

En ce qui concerne la *Flore de Madagascar* 142 familles sur un total de 189 ont déjà été publiées, soit environ les trois cinquièmes. Pour le Cameroun 26% des espèces environ sont publiées; pour le Gabon 30 %. Après quelques vicissitudes la publication de ces deux flores redémarre. Plusieurs volumes sont en cours de publication (dont les Orchidaceae du Cameroun, par Szlachetko et Olzewski en trois volumes) ou prévues dans un avenir proche.

Stefan VINCKIER & Erik SMETS

[Poster - SYST2]

Laboratory of Plant Systematics, Institute of Botany and Microbiology, K.U.Leuven, Leuven, Belgium

Morphology, ultrastructure, and typology of orbicules in the Loganiaceae

Tiny granules of sporopollenin, called orbicules or Ubisch bodies, can be observed on the innermost tangential and/ or radial walls of secretory tapetum cells. Orbicules were investigated with scanning electron microscopy, light microscopy, and transmission electron microscopy in 19 Loganiaceae s.l. species (13 genera) and 32 related species (27 genera). The investigated species cover all the recently recognised segregated families from Loganiaceae s.l. (Loganiaceae s.str., Gelsemiaceae, Geniostomaceae, Strychnaceae) and the Loganiaceae tribe Potalieae which is now included in the Gentianaceae. Orbicules were present in all Loganiaceae s.l. species, and in 22 related species (19 genera). On the basis of the observed morphological and ultrastructural variations, an orbicule typology has been worked out, similar to the former orbicule typologies in the Rubiaceae subfamilies Cinchonoideae and Ixoroideae. The systematic value of this typology has been tested by comparison with the most recent classifications within Loganiaceae s.l.. The Loganiaceae s.l. is a heterogeneous family which consists of several monophyletic groups. This is also reflected in the presence of different orbicule types (I, IIIa, IIIb, and IV) in this family. The two Strychnaceae tribes Antonieae and Strychneae are characterised by the presence of two very distinct types of orbicules: Antonieae (+ *Gardneria ovata*) possesses spiny type I orbicules, whereas the tribe Strychneae possesses spherical type IIIa orbicules. In the most recent classifications of the Loganiaceae s.l. a relationship between Strychneae and the Loganiaceae s.str. (incl. Geniostomaceae) is suggested, which is confirmed by the presence of type III orbicules in all of these taxa. Gelsemiaceae species possess irregular folded type IV orbicules. In Apocynaceae s.l. presence and absence of orbicules occurs. The tribes Plumerioideae, Apocynoideae, and Periplocoideae (Asclepiadaceae) are characterised by the presence of orbicules. The more derived genera (Asclepiadaceae, except Periplocoideae) are lacking orbicules. Comparable with the conclusions on the systematic application of orbicule characteristics in the Rubiaceae subfamilies Cinchonoideae and Ixoroideae, we suggest that tapetal orbicules can be useful at the tribal level in the Loganiaceae s.l..

Piet VORSTER

[Poster - SYST2]

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Conspectus of the South African Amaryllidaceae

Up to now a large amount of literature has been published on the South African species of Amaryllidaceae. Very little of this is generally available, the majority of information being in out-of-print and rare volumes, and scattered through a wide range of journals.

The aim of this project is to bring together all the available information in a single volume, in a standardised format. This format is designed to satisfy a broad range of clients, from herbarium taxonomists to enthusiastic amateur naturalists and gardeners.

The taxonomy of some groups has been revised in recent years, providing a structural framework for parts of the book dealing with those groups. Other groups have not been so treated, and here the current taxonomic usage of the National Herbarium, Pretoria, has been used as a framework.

Due to the collaborative nature of the work and the desirability to complete it within a reasonable timespan, additional field data have not been gathered. The data used, comprised those contained in the vast body of literature, as well as in the major South African herbaria.

The *Flora of southern Africa* (F.S.A.) region has 17 genera and some 230 species. 11 of the genera, and the majority of the species, are endemic to the F.S.A. region.

Most of the species are illustrated with watercolour paintings by the late Mrs. Barbara Jeppe (1921-1999). For each species the information is presented in a standard format comprising nomenclature and bibliography, description, chromosome information, variation, affinities and diagnostic features, life cycle, geographical distribution and habitat preference (including distribution map), and history. Identification keys to genera and species are provided.

Olivia WANYANA MAGANYI & Mary NAMAGANDA

[Poster - PLANT1]

Makerere University, Department of Botany, Kampala, Uganda

Edible plant species consumed by people around Buganda a central region of Uganda

A study carried out on food plant species as used by people living in Buganda a central region of Uganda revealed the existence of 92 edible plant species. Among these species, 4.35% are consumed as beverages, 25% consumed as fresh fruits, 34.78% as vegetables and 35.87% as cooked foods.

Some of these edible plant species are threatened with extinction due to habitat destruction and urbanisation which affect the biodiversity and may cause famine. The purpose of the study was to stimulate public awareness of the importance of these plant species, their habitats, lifeform, distribution and the different parts consumed.

A list of these plants is presented with reference to their mode of preparation and the different parts eaten. The interpretation of these data is based on the information gathered from resource personnel.

Justyna WILAND-SZYMANSKA

[Poster - SYST2]

Dep. of Geobotany, A. Mickiewicz University, Poznan, Poland

The family Hypoxidaceae in the flora of central Africa

The pantropical family Hypoxidaceae, with about 130 species worldwide, is a taxon that needs a taxonomic revision. In Central Africa (Democratic Republic of Congo, Rwanda, Burundi) only two of its genera, *Hypoxis* and *Curculigo*, occur. Numerous species of Hypoxidaceae were reported from this area, but in the recent studies their number was limited to three or four (Geerinck 1971, Champluvier 1985).

Access to new herbarium specimens from Central Africa, as well as study of specimens in numerous herbaria enabled this taxonomic revision of Hypoxidaceae in Central Africa. The study shows that this family is represented here by 21 species and 2 not formally named taxa of *Hypoxis* as well as one native and one cultivated species of *Curculigo*. In Democratic Republic of Congo 21 species and two not formally named taxa of *Hypoxis* and 2 species of *Curculigo* were found. In Rwanda there are only 3 species of *Hypoxis*. From Burundi 5 species of *Hypoxis* and one species of *Curculigo* is reported.

The study was based mostly on the morphology of vegetative and reproductive organs, especially leaves and inflorescences, and morphology of seeds. Many of taxa are for the first time reported from this area and some taxa new for science were described during this study (Wiland 1997a, b,c).

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[Lecture - SYST1]

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Morphometrics and species delimitation in the *D. praehensilis* complex (Dioscoreaceae)

Dioscorea praehensilis Benth. and its wild and cultivated relatives exhibit complex patterns of variation in the morphology of their vegetative, male and female organs. They are thought to be due to both the diversity of habitats which the wild taxa occupy and the effects of human selection on the cultivated ones. There may, of course, be considerable gene flow between such populations. Species delimitation is, therefore, extremely difficult for both the systematist and the applied biologist. This study used a number of multivariate morphometric techniques, including canonical discriminant analysis, to explore this variation and to reexamine the species boundaries erected by previous workers. In particular, material from Ethiopia and other countries of Southern and Eastern Africa was sampled, as previous work on these yam species has focussed mainly on West Africa. The results show that extensive revision of the species limits are necessary in this complex, and highlight the need for a pan-African molecular systematic study of these plants.

Christopher K. WILLIS¹ & Brian J. HUNTLEY²

[Lecture - FLOR2]

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² National Botanical Institute, Claremont, South Africa

SABONET: developing capacity within southern Africa's herbaria and botanical gardens

The main objective of the SABONET Project is to develop a strong core of professional botanists, taxonomists, horticulturists and plant diversity specialists within the ten countries of southern Africa (Angola, Botswana, Lesotho, Malawi, Mozambique, Namibia, South Africa, Swaziland, Zambia and Zimbabwe), competent to inventory, monitor, evaluate and conserve the botanical diversity of the region in the face of specific development challenges, and to respond to the technical and scientific needs of the Convention on Biological Diversity. Since 1996, the SABONET Project has been actively involved in developing human and infrastructural capacity amongst select botanical institutions within the southern African region. This paper summarises some of the achievements to date and outlines some of the challenges still facing southern African herbaria and botanical gardens.

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[Lecture - AREAS3]

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Developing a greater understanding of the flora of the Nyika

As part of SABONET's project activities, collaborative plant collecting expeditions are periodically undertaken to under-collected areas of southern Africa. The first collaborative expedition undertaken within the project was to the Nyika Plateau (Malawi/Zambia), the largest montane complex in south-central Africa, in March/April 2000. This paper presents a brief history of botanical exploration of the Nyika, and discusses the progress that has been made through the SABONET Project towards developing an inventory of the Nyika flora, as well as highlighting aspects relating to the plant diversity, endemism and phytogeography of the area. Assessments made of the endemic and near-endemic plants using the new IUCN Red Data Categories (1994) are also presented. Opportunities for further collaborative research on the Nyika are proposed.

Jean-Michel YANGAKOLA

[Poster - AREAS2]

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Analyse phytogéographique de la flore des savanes de Ngotto (République Centrafricaine)

Les savanes étudiées sont situées à la périphérie nord de la Forêt de Ngotto, au sud-ouest de la République Centrafricaine. Cette zone de contact forêt/savane fait l'objet d'études approfondies dans le cadre du programme «Conservation et utilisation rationnelle des écosystèmes forestiers en Afrique centrale (Ecofac)». L'objectif de ce travail est de faire l'interprétation phytogéographique des inventaires floristiques disponibles en utilisant le système de White (1983). Les résultats mettent en évidence les contributions respectives des éléments floristiques guinéo-congolais et de transition soudano-guinéens.

Phytogeographical analysis of the flora of the Ngotto savannas (Central African Republic)

The savannas, that are studied here, are situated at the northern border of the Ngotto Forest, in the south-western of the Central African Republic. This area of forest-savanna mosaic has been studied as part of the UE project "Conservation and rational utilization of forests ecosystems in Central Africa (Ecofac)". The goal of this paper is to propose the phytogeographical analysis of all the species recorded according to the system of White (1983). The respective contributions of guineo-congolian and soudano-guinean floristic elements are given.

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[Poster - AREAS1]

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Analyse phytogéographique de la Forêt de Ngotto (République Centrafricaine)

La Forêt de Ngotto est située dans le sud de la République Centrafricaine; elle fait l'objet d'études approfondies dans le cadre du programme «Conservation et utilisation rationnelle des écosystèmes forestiers en Afrique centrale (Ecofac)». L'objectif de cette étude est de faire l'interprétation phytogéographique des inventaires forestiers disponibles en provenance de la Forêt de Ngotto. La typologie phytogéographique est étudiée selon le système de White (1983). Les résultats mettent en évidence les contributions respectives des éléments floristiques congolais et camerounais.

Phytogeographical analysis of the Ngotto Forest (Central African Republic)

The Ngotto Forest is situated in southern of the Central African Republic. This Forest has been studied as part of the UE project "Conservation and rational utilization of forests ecosystems in Central Africa (Ecofac)". The goal of this paper is to propose the phytogeographical analysis of all the species recorded in the numerous forests surveys that are available. The phytogeographical types used in this study are chosen according to the system of White (1983). The respective contributions of congolian and cameroonian floristic elements are presented.

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[Poster -PHYTO1]

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Comparative ecological and phytogeographical studies of the coastal lands of Egypt

The coastal lands of Egypt extends for about 2070 km along the Mediterranean (about 970 km) and the Red Sea (about 1100 km) coasts. Both belong to the arid lands. However, the Red Sea coast is extremely arid and the Mediterranean coast is less arid. Annual rainfall of the Red Sea coast is usually less than 30 mm but its mountainous country receives orographic rain up to 60 mm. The annual rainfall of the Mediterranean coast ranges between 60 to 200 mm.

Ecologically, the Mediterranean coastal lands may be categorized into seven main habitats: aquatic, reed swamp, salt marsh, sand dune, rocky ridge, non-saline depression and barley field. Also, seven habitats characterize the Red Sea coastal land, these are: aquatic, mangrove, reed swamp, salt marsh, sand dune, desert plain and wadis and coastal mountain. Each of these habitats has its own vegetation types which may be

divided into different communities. The flora of these vegetation types is formed of xerophytic, halophytic, helophytic and psammophytic bushes, shrubs, sedges, rushes and grasses, trees are few. The aquatic habitats are characterized by salt tolerant weeds. Hygrophytes are common in the shaded areas of the mountains. The ecological relationships of the dominant and most characteristic species as well as the geographical distribution of these species are discussed.

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Volume 1 (1988) – E. ROBBRECHT. Tropical woody Rubiaceae. Characteristic features and progressions. Contributions to a new subfamilial classification: 272 p.
Not available.

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Systematic revision of the continental African representatives of this genus (19 species).

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Nine macrosystematic papers. Supplement to the classification outlined in volume 1, with updated edition of index to genera.

✻ OF INTEREST FOR THE FLORA AND VEGETATION OF TROPICAL AFRICA

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Detailed written versions of 26 presentations at the Conference, arranged according to the themes Evolution, Chemistry and ethnobotany, Palaeotropical Rubiaceae, Neotropical Rubiaceae, and Biology and structure. These, together with an appended index to genera, make the book a valuable tool for angiosperm systematics and Gentianales research.

✿ Volume 8 (1999) – B. SONKÉ. ***Oxyanthus* (Rubiaceae - Gardenieae - Gardeniinae) en Afrique centrale: étude systématique: 106 p.**

A classical taxonomic revision of the central African representatives of *Oxyanthus* (17 species). Full index (covering the whole of Africa) to the taxa of the genus. In French.

✿ Volume 9 (1998) – P. DE BLOCK. **The African species of *Ixora* (Rubiaceae - Pavetteae): 218 p.**

Monographic treatment of the 37 native African species of the well known ornamental genus *Ixora*. Full taxonomic treatment of all species (each with an illustration and a distribution map). Exhaustive general part on morphology, anatomy, palynology etc.

✿ Volume 10 (1997) – A. LUBINI. **La végétation de la Réserve de biosphère de Luki au Mayombe (Zaïre): 155 p.**

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Volume 11 (1997) – E. QUANTEN. **The polypores (Polyporaceae s.l.) of Papua New Guinea. A preliminary conspectus: 352 p.**

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✿ Volume 12 (2000) – R. Claßen-Bockhoff. **Inflorescences in Bruniaceae. With general comments on inflorescences in woody plants: 310 p.**

This work not only increases our knowledge of the small South African family Bruniaceae but also deals with the simple but delicate question of how to delimitate inflorescences in woody plants. More than 80 % of the species of Bruniaceae are illustrated in detail by schematic side-views and photos. Referred to them the 'brunioid' reference framework is introduced. It differs from all concurrent concepts in strictly

distinguishing caducous 'inflorescences' from persistent 'flowering shoot systems'. The study concludes with a summary of new insights into the intergeneric relationships of the Rubiaceae. It includes a critical debate of the most important morphological concepts applied to inflorescences in woody plants. For that reason it is not only addressed to morphologists and Rubiaceae specialists, but might be of general interest to all dealing with inflorescences as to systematic, morphological, ecological, genetic and evolutionary aspects.

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Volume 1 (1992) - L. ANDERSSON. A provisional checklist of neotropical Rubiaceae: 199 p.

Preliminary overview of the Rubiaceae in the neotropics, based on data collected in eight major herbaria. Distribution data in tabular form give a provisional idea of the centers of diversity of the genera. Provisional nomenclatural index with names in current usage, their basionyms and commonly recognized synonyms.

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Review of published information on importance, nutritive content, collecting, trade, culture, local tradition, etc.; 300 species are listed.

Volume 6 (1993) – P. RASMONT, Y. BARBIER & A. EMPAIN. **Microbanque Faune-Flore, logiciel de gestion de banques de données biogéographiques. Version 3.0:** xv + 200 p. + ann.
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Proceedings of a symposium on the relationships between botanical collections and horticulture, held in the National Botanic Garden of Belgium (March 19, 1993). In Dutch, with English abstracts.

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Commented distribution maps of 52 species of fungi.

Volume 13 (1996) – J. GIELS & T. GERVAIS, eds. **Aspects of morphogenesis of leaves, flowers and somatic embryos:** 88 p.

Lectures given during a joint meeting of the Belgian Plant and Tissue Culture Group BPTCG and the *F.W.O. Research Network Plant Morphogenesis*. Contributions include aspects of plant modelling, leaf and flower development and somatic embryogenesis, highlighting mathematical, biophysical, physiological, genetic and molecular approaches.

Volume 14 (1997) – A. VANDERPOORTEN. A bryological survey of the Brussels Capital Region (Belgium): 83 p.

Detailed mapping (225 grid maps) of the bryoflora of the Brussels Region. With discussion of specific regional frequency, floristic richness, environmental factors and conservation.

Volume 15 (1997) – E. SMETS, L.P. RONSE DECRAENE & E. ROBBRECHT, eds. 13th Symposium Morphology, Anatomy and Systematics. Programme and abstracts. Leuven, April 7-11, 1997: 189 p.

Volume 16 (1998) – P.A.C. SENNA, M.G.M. SOUZA & P. COMPÈRE. A check-list of the algae of the Federal District (Brazil): 88 p.

A list of all the algae reported up to the beginning of 1998 (711 names in the 65 references located), brought to the standard of present day algal taxonomy.

Volume 17 (1998) – E. COPPEJANS. Flora van de Noord-Franse en Belgische zeewieren: 462 p.

A revised and augmented edition, in Dutch, of volume 9.

Volume 18 (2000) – A. SOTIAUX, O. SOTIAUX, A. VANDERPOORTEN, L. DURWAEL, coll. A. EMPAIN. The distribution of bryophytes in the Forest of Soignes (south of Brussels, Belgium): 83 p.

A detailed inventory of the bryoflora of a large forest (71 km²) just south of the conurbation of the Brussels Capital Region, based on field observations of the authors from 1980 to 1998. Grid maps are presented for the 257 bryophytes found. The data are used to list the hot spots with highest bryo-diversity and to propose management measures.

Volume 19 (2000) – J. CHENEY, J. NAVARRETE NAVARRO AND P. WYSE JACKSON, eds. Action Plan for Botanic Gardens in the European Union: 68 p.

The Action Plan sets out more than thirty objectives on science, horticulture, education, training, management, funding, etc., and is designed for anyone with an interest in plants and the environment. It wants to strengthen the EU botanic gardens and to foster cooperation and networking.

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* OF INTEREST FOR THE FLORA AND VEGETATION OF TROPICAL AFRICA

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- AREAS1 The lowland forest flora's of Africa – *Les flores des forêts africaines de basse altitude*
- AREAS2 Flora and phytogeography of miombo type woodlands and savannas – *Flore et phytogéographie des forêts claires de type miombo et des savanes*
- AREAS3 The montane floras of Africa – *Les flores montagnardes de l'Afrique*
- AREAS4 Plant diversity of Madagascar, the Mascarenes and the Comores – *La diversité des plantes de Madagascar, des Mascareignes et des Comores*

Floristics / Floristique

- FLOR1 The history of botanical exploration of Africa South of the Sahara – *L'historique de l'exploration botanique de l'Afrique au sud du Sahara*
- FLOR2 Herbaria and botanical gardens in tropical Africa: their role for systematics – *Les Herbiers et Jardins botaniques en Afrique tropicale: leur rôle en systématique*
- FLOR3 Progress in the Flora's of Africa – *Progrès des Flores africaines*
- FLOR4 Computerised floristic information for the African flora – *Données floristiques informatisées de la flore africaine*

African macrofungi / Macromycètes africains

- MACRO1 African macrofungi – *Macromycètes africains*

Phytogeography / Phytogéographie

- PHYTO1 White's concepts refined – *Révision des concepts de White*
- PHYTO2 Techniques and tools – *Techniques et méthodes*

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Various contributions / Autres contributions

- VARI Various contributions – *Autres contributions*

XVth AETFAT Congress (August 28 - September 2, 2000)

ABSTRACTS

The present issue gives the abstracts of the presentations at the sixteenth meeting of the Association for the Taxonomic Study of the Flora of Tropical Africa ('AETFAT'), held at the National Botanic Garden of Belgium in 2000. The meeting strongly focuses on the original aim of AETFAT, i.e. taxonomy of African plants and phytogeography. Themes include topics in floristics (e.g. computerised floristic information for the African flora), systematics (e.g. molecular approaches, taxonomy and conservation of orchids), area-oriented contributions (e.g. montane floras) and phytogeography (e.g. reconsideration of White's concepts).

XVIème Congrès de l'AETFAT (28 août - 2 septembre 2000)

RÉSUMÉS

Ce numéro rassemble les résumés des présentations à la seizième réunion de l'Association pour l'Étude Taxonomique de la Flore d'Afrique Tropicale («AETFAT»), tenue au Jardin Botanique National de Belgique en 2000. Le Congrès est axé spécifiquement sur le dessein original de l'AETFAT, à savoir l'étude de la taxonomie des plantes africaines et la phytogéographie. Les thèmes abordent des sujets en floristique (p.ex. données floristiques informatisées de la flore africaine) et en systématique (p.ex. approches moléculaires, taxonomie et conservation des orchidées), des contributions à l'échelle régionale (p.ex. flores montagnardes) et en phytogéographie (p.ex. reconsidération des concepts de White).

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